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ALBERT CALLESS.

M.P., M.D., F.R.C.S.

Professor of Clinical Surgery,
Surgeon to the Hospital.

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PERITONITIS

AND ITS VARIETIES

THEIR PATHOLOGY, CLINICAL
AND TREATMENT

FREDERICK TREVELL

STATIONER TO THE LONDON HOSPITALS, &c.
THE DUKE OF YORK'S HOSPITAL, &c.
(SOUTHERN LANE, LONDON, E.C.)

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THEIR PATHOLOGY, CLINICAL MANIFESTATIONS,
AND TREATMENT

BY

FREDERICK TREVES, F.R.C.S.

SURGEON TO THE LONDON HOSPITAL ; SURGEON-IN-ORDINARY TO H.R.H.
THE DUKE OF YORK ; LATE EXAMINER IN SURGERY AT THE
UNIVERSITY OF CAMBRIDGE

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PERITYPHLITIS

DEFINITION AND NAMES.—By perityphlitis is understood a peritonitis localised in the region of the cæcum. Many names have been applied to this condition, which serve to perpetuate current views of its pathology. The fact that the effusion in this form of peritonitis is nearly always circumscribed, led early to the belief that it is extraperitoneal, and located in the connective tissue behind the cæcum. In early days, therefore, this affection was known as “iliac phlegmon,” and later the more precise term “paratyphlitis” conveyed the same view of the position of the inflammatory changes. When these names were in use it was erroneously assumed that the cæcum had a non-peritoneal surface which brought it in contact with the connective tissue of the iliac fossa, and when the etiology of the trouble came to be investigated it was assumed that the mischief started in the cæcum itself. Upon this belief was based the term “typhlitis”; that is to say, an inflammation of the cæcum itself. This name appears to have been first used by Albers in 1838. In Copland’s *Dictionary of Medicine*, published in 1834, although the cæcum and the supposed connective tissue around it are still pre-eminent in the pathology, yet it is recognised that the trouble may start in the appendix vermiformis. Burne seems to have been the first to develop the modern doctrine of the predominant part played by the appendix in this affection. Fitz in 1886 (9) placed the pathology of perityphlitis upon a sound basis, and demonstrated the part of the appendix in its production. Finally, the uncouth name “appendicitis” has been given to this disease.

The name “perityphlitis” does not denote the seat of origin of the malady, but indicates with sufficient clearness the predominant pathological feature of an affection which may arise in more ways than one, and which has no precise clinical individuality until the peritoneum in the cæcal region has become inflamed.

The literary history of perityphlitis is well given by Dr. Kelynack in his work on the *Pathology of the Vermiform Appendix* (Manchester, 1893).

NORMAL ANATOMY.—The cæcum is that part of the large intestine which lies below the level of the ileo-cæcal valve—that is to say, below

the point of entrance of the ileum. It is always entirely covered by peritoneum, and is never attached by areolar tissue to the iliac fascia. The mesocæcum, formerly described, has no existence. The cæcum is usually found lying upon the psoas muscle, and is so placed that its apex just projects beyond the inner border of that muscle, and corresponds with a point a little to the inner side of the middle of Poupart's ligament. In exceptional instances the cæcum may be found within the pelvic cavity, or even to the left of the median line. In examples of imperfect descent of the caput coli this part of the bowel may be met with under the umbilicus, or close beneath the liver, or high up in the right loin. There is no reason why perityphlitis should not be met with in any of these unusual situations.

There are certain peritoneal fossæ about the cæcum, but they possess little or no pathological importance; they may seem to limit inflammatory effusions. Now and then the diseased appendix has been found lodged in one of these fossæ, usually in the inferior ileo-cæcal.

The vermiform appendix is very variable. Its average length is about $3\frac{1}{2}$ inches. It may be represented by a mere stump some half-inch in length, or on the other hand may measure no less than 9 inches. It is usually found twisted upon itself, and this condition is due mainly to the shortness or scantiness of its mesentery. The meso-appendix rarely extends more than one-half or two-thirds of the way along the little organ, and is liable also to much variation.

The position of the appendix varies considerably. In the adult body the undisturbed appendix will most often be found behind the end of the ileum and its mesentery, and to point in the direction of the spleen. Another locality not infrequent is a vertical position behind the cæcum or to its inner side. When diseased and exposed by operation the appendix is often to the outer side of the cæcum. The process may occupy the pelvis, and may be found in contact with the sigmoid flexure, the rectum, the uterus, or the bladder. Or it may be found to have entered a right inguinal or a right femoral hernia.

The structure of the appendix is, in general terms, like that of the cæcum. It has, however, the important character of a narrow lumen and a thick wall. The valve of Gerlach, which was supposed to protect the orifice of the appendix, has no existence. The orifice of the appendix—that is, the point of its opening into the cæcum—may be a mere pinhole, or may admit a No. 5 or No. 7 catheter. One very common result of disease is to narrow or obliterate (in whole or in part) the lumen of the little process.

The mucous membrane is liberally supplied with Lieberkuhn's glands; but the most noteworthy feature in the anatomy of the appendix is the very large quantity of lymphoid tissue found in its walls. It may be evenly distributed, or arranged in follicles; and it is always most abundant in children. This collection of adenoid tissue has been compared to that which constitutes the tonsil. Probably it has the same function; that is, to supply leucocytes to repel a bacterial invasion.

The calculi sometimes found in the tonsil may be compared with those found in the appendix.

The so-called muscular coats of the appendix are very thick, the inner or circular layer being the more substantial and the better marked. These coats are made up, however, mainly of fibrous tissue; there is a little muscular tissue found in the inner layer, and a trace in the outer layer, but the amount altogether is very small.

In conclusion it may be pointed out that the appendix represents the terminal part of a long, curved, and conical cæcum, such as may be seen in many apes. It is evident that it is disappearing from the mammalian series. It is a functionless and useless relic, and is the least constant part of the alimentary canal. The diseased conditions which so frequently attack it tend to bring about its obliteration, and it would appear as if its anatomical elimination was being hastened by pathological troubles.

MORBID ANATOMY AND PATHOLOGY.—The peritonitis, which is the essential feature of perityphlitis, may take its origin from morbid conditions within the cæcum or the appendix. It may be said at once that in the vast majority of cases the trouble begins in the appendix, and that perityphlitis due to a primary lesion of the cæcum is undoubtedly rare. The pathology of the affection may be considered under the following headings:—

- A. Perityphlitis taking origin from the cæcum.
- B. Perityphlitis taking origin from the appendix. (a) With catarrh or ulceration of the appendix. (b) With gangrene of the appendix. (c) With stricture or occlusion of the appendix. (d) With actinomycosis of the appendix.
- C. The Peritonitis.
- D. The Abscess.

A. Perityphlitis taking origin from the cæcum.—The cases that come under this category are, as already stated, very uncommon. Certain writers have gone so far as to assert that perityphlitis of cæcal origin does not exist. Others state that this variety is so rare that not more than one instance of it would be found among some 200 examples of perityphlitis.

Einhorn, as the result of a study of 18,000 post-mortem examinations, states that perityphlitis is of appendicular origin in 91 per cent of the cases, and that in the remaining 9 per cent it is due to primary perforation of the cæcum. Surgical experience would lead us to place the appendicular cases at a higher percentage of frequency.

Osler records two cases of perforation of a cæcal ulcer leading to a perityphlitic abscess. Fitz gives three cases of such perforation—one was due to a fish bone, one to a pin, and a third was ascribed to strangulation of the cæcum.

As an exemplary case of perityphlitis due to trouble in the cæcum, the following may be cited:—

A carpenter, aged nineteen, was admitted into my wards at the London Hospital on 4th July 1894 with perityphlitis. He had been long troubled by constipation. On 1st July, while lifting a heavy weight, he felt a sudden pain in the right iliac fossa, became collapsed, and in thirty minutes vomited. He was sick four times. The bowels had not acted for three days previously. He presented all the symptoms of perityphlitis attended with diarrhoea, and a temperature of 99° to 101° F. An abscess formed in the caecal region, and was opened on 7th July. The pus had a faecal odour, and was considerable in amount. The appendix was perfectly normal in every particular. Some lymph was found upon the caecum at one spot, but it was not disturbed. On 15th July faeces began to escape from the wound, and a faecal fistula was established. The man ultimately did well.

Perityphlitis of caecal origin depends, no doubt, upon ulceration of the caecum. Such ulceration may be caused (*a*) by a sharp foreign body; more than one case of perityphlitis has been found to be due to the impaction of a pin in the caecum; (*b*) by epithelioma of the caecum. This condition was illustrated by the case of a medical man under my care who had an ordinary subacute perityphlitis. An abscess formed, and was opened. The appendix to all appearance was quite normal, but there was a perforation of the caecum. It was shown later that this perforation was at the seat of an epitheliomatous growth. The patient was engaged in active work up to the time of the attack of perityphlitis, although he was wasting, was feeling ill, and had had indefinite trouble with his bowels. The ulceration of the caecum may further be due to (*c*) tuberculosis, (*d*) typhoid fever, (*e*) dysentery, and (*f*) actinomycosis.

I have operated upon a case of perityphlitis, in a young lad, due to tuberculous ulceration of the caecum, in which the appendix was to all appearance perfectly normal, and was free from the adhesions which involved the caecum.

So far as I am aware, in all the cases of perityphlitis ascribed to typhoid fever, the appendix was the seat of the actual perforation and not the caecum. Ulceration of the caecum in dysentery does not appear to lead to perityphlitis. Actinomycosis is dealt with on p. 41.

Finally, the commonest cause of such cases of perityphlitis as arise in the caecum is (*g*) the stercoral ulcer. The stercoral ulcer is due to the mechanical pressure and the chemical irritation of faecal masses which have long been lodged in the caecum. Precisely similar ulcers are produced in the appendix by the lodgment of little masses of faecal matter in that tube. In cases of considerable faecal impaction the greatest strain falls upon the caecum, and in absolute obstruction of the colon low down, the bowel, if it gives way, will give way in the caecal region.

Long-impacted faecal masses in any part of the colon give rise to catarrh. This catarrh when of severe degree serves to produce the spurious diarrhoea which is seen in cases of obstruction of the lower

colon. This catarrh often passes on to ulceration. It is by means of this catarrh that impacted faecal masses are often dislodged. Inasmuch as faecal impaction is most common in the caecum, it is no matter of wonder that the stercoral ulcer should be most common in that part of the colon.

If the ulcer acquires a sufficient depth to allow the peritoneum to be infected, perityphlitis results. To produce this condition it is not necessary that the caecum should be actually and freely perforated. The following case serves to illustrate this point. A man of fifty, with advanced carcinoma of the sigmoid flexure, had the whole of the colon above the stricture occupied by retained faecal matter. In such cases of obstruction the strain, as already said, falls mainly upon the caecum; and this patient became the subject of a well-marked attack of acute perityphlitis. An abscess followed, which was incised in due course. The contents were very foul, but no faeces had escaped. Lymph covered the caecum, but the appendix was apparently quite sound.

It is perhaps needless to say that faecal accumulation may be excessive, and may even cause acute inflammation of the caecum, and yet not produce the symptoms of perityphlitis. Thus Dr. Harley reports the case of a youth whose colon was blocked from caecum to anus with faecal matter. The mucous membrane of the bowel was inflamed and purulent. The lad died with septic symptoms, but there were no evidences of perityphlitis.

I have met with examples of localised peritonitis about the hepatic flexure of the colon leading to suppuration in patients whose bowel contained masses of scybala, and in whom the acute abscess with its foetid contents could only be ascribed to a stercoral ulcer.

While claiming a definite position for the stercoral ulcer in the production of perityphlitis it must be owned that the appendix may be the cause of perityphlitis and yet appear to be quite normal to the eye. Many such cases have been reported. I have met with such examples, but have found the apparently healthy appendix to be diseased when subjected to minute examination. I would especially point out, however, that in these particular examples the caecum itself was also quite normal in appearance.

Further, it may be said that when a perforation of the caecum is discovered at the bottom of a perityphlitic abscess, it affords no evidence that the mischief began in the caecum, or that the perforation was primary. Most of the perforations so met with are secondary, the trouble having begun in the appendix, and the pus having made its way into the caecum from without.

Finally, it must be allowed that the appendix is frequently infected from a diseased caecum.

B. Perityphlitis taking origin from the appendix.—(a) *With catarrh or ulceration of the appendix.*—Catarrh of the appendix is evidently of very common occurrence. It is quite commonly found in post-mortem examinations by those who are taking note especially of the condition of

the appendix. It may be safe to conclude that simple and uncomplicated catarrh of the appendix leads to no symptoms, and cannot be clinically recognised. There is evidence that it may be acute or chronic, and that it may be entirely recovered from. Its origin is due, no doubt, to the same causes which lead to catarrh in other parts of the intestine. Yet now and then it appears to be induced by a minute fragment of faecal matter retained in the appendix which, as a solid and decomposing foreign body, sets up irritation. Very often, indeed, I believe the catarrh extends to the appendix from the caecum. It is most common to observe that mischief in the appendix, leading to perityphlitis, is set up by constipation, by a lodgment of faecal matter, or of a mass of undigested food in the caecum. It is reasonable to conclude that some catarrh or even ulceration of the caecum may be induced by such accumulation, and that the inflammation may spread to the appendix, which seems to be peculiarly susceptible to catarrh.

In a few instances a minute foreign body is the cause of the catarrh. Such instances will be alluded to later.

The morbid changes produced by the catarrh are precisely the same as in other parts of the intestinal canal. The epithelium of the surface, as well as that which lines the crypts of Lieberkuhn, is shed, the retiform tissue becomes infiltrated with leucocytes, and the whole mucous membrane is thickened. The process may end in complete recovery, no doubt; but, if long continued, it may lead to one or other of the following results:—

(a) The watery discharge, produced by long-continued catarrh, may lead to an inorganic *concretion*. These concretions are no doubt formed from the salts contained in the catarrhal fluid. A precisely similar formation of a stony concretion, as a result of long-continued catarrh, is met with in the nose as a rhinolith. The rhinolith appears in all cases to be the product of long-continued nasal catarrh. Occasionally a minute speck of foreign matter, such as a piece of nutshell, forms the nucleus of the concretion. The concretions are usually of a mortary consistence moderately friable, and are composed of phosphates of lime and magnesia and of carbonate of lime, mixed or stained with a little faecal matter. Some have been found to contain cholesterin. Owing to the slight admixture of faecal matter they are often called faecal concretions. I do not know that the common assertion that they contain “inspissated muens” is well founded. Some of them are veritable stony concretions, and can be evenly divided with a fine saw. The firmer stones are much like the rhinoliths on section. I have never satisfied myself that, as some affirm, the actual nucleus of these concretions is composed of faecal matter. I have found bodies in the appendix with a putty-like interior, resembling faecal matter with a casing of lime salts. The real concretions must be clearly distinguished from the little pellets of moulded and often hard and brittle faecal matter which are often met with in the appendix.

The real concretions vary greatly in size. They are generally of even and symmetrical outline. Some are very minute, others are over an inch

long. The largest which I have myself removed was more than an inch in length and nearly half an inch in diameter. Blackadder found an earthy-looking concretion, the size of a thrush's egg, in a man's appendix. It had caused no trouble during life.

These concretions often bear the very closest resemblance to certain vegetable products. The smallest are readily mistaken for tomato-seeds and fig-seeds, the larger for orange-pips, grape-seeds, or grains of wheat, and the largest for cherry-stones and date-stones. I possess two concretions which, before section, I could not tell from a cherry-stone and a date-stone respectively. I have never found such seeds or fruit-stones in the appendix, and I believe them to be exceedingly rare. It is impossible to understand how a cherry-stone or date-stone, or even an orange-pip, could enter the appendix, and the imitation made by a concretion is so exact, that I am disposed to think that very many of the reported cases of foreign bodies are examples of concretions. That a grain of wheat could reach the appendix quite unchanged is most difficult to believe. A portion of a grape-skin is very remarkably imitated by a layer of thick, glutinous, dark greenish-purple mucus.

The frequency with which concretions are found in the appendix in cases of typhlitis is variously stated by different authors. Matterstock found them in 53 per cent of the collected cases, Fitz in 47, Krafft in 34, and Murphy in 30. I am inclined to think that the lower estimates, that is, about 30 per cent, are more near the truth. In 400 post-mortem examinations of all kinds, Ribbert found a faecal concretion in the appendix in 10 per cent of the bodies.

(β) In the second place, long-continued catarrh may lead to great *thickening of the appendix*. The tube is found to be of unusual size and stiff and straight. Its wall may be from $\frac{1}{6}$ to $\frac{1}{8}$ of an inch in thickness, and its lumen may be found full of mucus.

(γ) Thirdly, catarrh may lead, and apparently often does lead, to *ulceration of the appendix*. Some degree of ulceration of this little process is very common in perityphlitis.

The ulcer need not be preceded by definite catarrh, it may be primary. The primary ulcer may be due to the presence of a foreign body, to septic infection, to typhoid ulceration, or to tuberculosis. Foreign bodies are not common in the appendix, and but very rarely are they the cause of perityphlitis. Many reputed foreign bodies, as already stated, are really concretions formed in the appendix itself as a result of chronic catarrh. Among the foreign substances which have been actually found in the vermiform process are the following: pins, minute fragments of bone and of nutshell, small shot, bristles, splinters of wood, and a few other very small fragments of indigestible matter. The foreign bodies thus lodged may induce catarrh or set up ulceration, or, on the other hand, may cause no disturbance. Lewis found in the appendix of a man of eighty-eight no less than 122 small shot. The patient had had no symptoms of trouble in the appendix during life. The frequency with which foreign bodies are found in the appendix

in actual cases of perityphlitis is variously stated by different writers. Fitz and Matterstock found foreign bodies in 12 per cent of their collected cases of perityphlitis, Fergusson in 7.5 per cent, Krafft in 4 per cent, and Murphy in 3.5 per cent. My own experience would lead me to think that 3 per cent is more nearly correct than 12 per cent.

In some instances the foreign bodies had escaped from the appendix through the ulcerous openings they had made in its wall.

Ulcers have been found very often in association with concretions, the condition having been preceded by long-continued catarrh.

The aspect of the ulcer in the appendix calls for no description. There may be several ulcers, or the whole length of the little tube may be involved. If perforation take place it may be in more than one spot. When the ulceration has been long-abiding, the wall of the process is found to be much thickened, and its lumen to be occupied by a slimy mucus.

One must assume that certain ulcers met with in the appendix are due to an actual septic infection, without laying stress upon the precise manner in which that infection was brought about.

Typhoid lesions are rare in the appendix. In a few recorded cases of typhoid fever death has been due to perforation of the appendix. Fitz states that in 167 collected cases of perforation in typhoid fever the appendix was found to have given way in five instances (about 3 per cent). Perityphlitis, due to perforation of the appendix in typhoid fever, is a rare condition, but one which undoubtedly occurs.

Tuberculous ulceration of the intestine may spread to the appendix, although it is remarkable that even when the adjacent bowel is deeply affected this little process may escape. Fenwick and Dodwell found some ulceration of the intestinal canal in 56.5 per cent of the bodies of persons who had died of phthisis. In only 17 instances among 2000 autopsies is the ulceration stated to have been limited to the appendix. Habershon and Bristowe, on the other hand, appear to consider that tuberculous ulceration of the appendix is relatively common. Dufour records a case of fatal perityphlitis due to perforation of the appendix, from what was assumed to be a tuberculous ulcer. Such cases are, however, undoubtedly very uncommon. A young man, a tuberculous patient, recently under my care, had had several attacks of perityphlitis. I opened his abdomen and found the appendix much involved, and so surrounded by complex adhesions that I was unable to remove it. The whole peritoneum was affected with tuberculous peritonitis. It is certain that in this instance the trouble began with a definite attack of perityphlitis.

The ulcer in the appendix may lead to *perforation* of the process. This perforation may be of any size or shape, from a mere pinhole to what appears to be a rent of a greater part of the lumen. The perforation may take place into a normal peritoneal cavity, or into a space more or less confined by adhesions.

It is by no means necessary that an ulcer of the appendix should lead to perforation in order to produce the phenomena of perityphlitis.

Over and over again the vermiform process, removed from the midst of a perityphlitic abscess, has revealed no evidence of perforation. If all the cases of perityphlitis of all varieties and degrees be considered together, then it may be said that in the majority there is no perforation: on the other hand, it is estimated that in from 60 to 70 per cent of the really acute cases a perforation of the process may be expected.

In the second place, the ulcer of the appendix may lead to *stricture*, or to more or less obliteration of the lumen of the process. The mucous membrane over a varying extent is destroyed by the ulcerative process; granulation tissue covers the denuded surface, and, if the two opposed walls of the little tube adhere, a stricture results. The whole of the lumen of the process may be occupied by granulation tissue, and several strictures may form in the same appendix. The stricture and its results are dealt with on page 12. In not a few instances, where the ulceration occupies the whole internal surface of the appendix, the lumen of the tube finally becomes entirely obliterated, fibrous tissue occupies the once free passage from one end to the other, and the appendix is converted into a solid fibrous cord. This is one of the natural processes of cure in perityphlitis. Any degree of stenosis may result from this condition; there may be a mere linear stricture constricting the appendix like a fine ring; there may be several strictures of like character, or the appendix for one-fourth, or one-third, or one-half of its length may be converted into a fibrous cord.

Between multiple strictures cavities of varying dimensions may be left. The whole lumen of the process, although patent, may be found evenly narrowed from one end to the other.

Now and then the obliteration of the appendix is so complete, that only a careful examination of the adhesions which probably exist around the cæcum will reveal any trace of the organ. Ribbert found in 400 post-mortems more or less obliteration of the appendix in 23 per cent, and found also—as may have been expected—that this particular lesion was more common as age advanced.

(b) *With gangrene of the appendix.*—In some cases the appendix is the seat of a more or less extensive sloughing or gangrenous process. Clinically this condition is nearly always associated with symptoms of a very severe and acute character, especially when the gangrene is complete.

There is evidence to show that the whole of the part may become gangrenous in twenty-four hours. The degree of the sloughing varies; in some instances the whole of the mucous membrane becomes necrosed or there is considerable sloughing of the membrane in patches; in other examples the whole of the appendix may be gangrenous from base to tip. It may, indeed, be found detached as a slough, and I have so discovered it floating in a perityphlitic abscess. Or the gangrene may be of much more limited extent; the tip only of the process may have perished, or, curiously enough, only the base may have sloughed. In the latter instance a more or less sound appendix may be found detached from

the cæcum by one of these basal sloughs. The gangrene may involve a portion only of the appendix wall, and in some cases the limited extent of it may be inexplicable. The causes of gangrene of the vermiform process are not always apparent, but it is safe to conclude that they are the same as those which produce gangrene elsewhere. In not a few instances the sloughing appears to be the result of a septic infection of an already damaged appendix. In some cases, for instance, in which the whole organ had perished, a concretion has been found. In such conditions it would appear as if a virulent septic inflammation had made its appearance in an appendix long diseased. Certain it is, that a concretion may exist in the appendix for years and cause no trouble.

In another series of instances there is a suggestion that the convoluted appendix may have become so twisted upon itself as to have brought about an occlusion of its vessels. A like condition is seen in volvulus of a loop of bowel like the sigmoid flexure. Extreme alterations in the volume of the cæcum may lead to such a twisting.

In certain examples of gangrene it is possible that the vessels leading to the appendix may have become thrombosed. I have found these vessels very nearly occluded in some examples of relapsing perityphlitis. Mere bending of the appendix mesentery, or the pressure of adhesions, may lead to such a diminution in the lumen of the vessels of the process. Foreign bodies have been credited with the production of gangrene, but upon no substantial evidence. On the whole it is probable that most of the examples of extensive gangrene are due to infection of the appendix with pyogenetic micro-organisms such as the streptococci.

(c) *With stricture or occlusion of the appendix.*—Stricture of the appendix plays a prominent part in the production of perityphlitis, and especially of the relapsing form. The mode of production of these strictures has been already alluded to (page 11).

The effect they produce varies according to the condition of the mucous membrane on the distal side of the stenosed part. If this mucous membrane be quite healthy, the distal part of the appendix becomes distended with mucus. The cyst thus produced has a very remarkable appearance; it is usually of considerable size, is sausage-shaped, is of even outline, and the proximal end of it may bulge into the cæcum as a large hemispherical swelling. The cyst contains from one to four ounces of perfectly white, translucent, odourless mucus. An excellent specimen of such a cyst is to be found in the Cambridge Museum; it was removed from an old subject during a post-mortem examination. This cystic dilatation has been termed a "mucocoele" by Féré. Weir describes a case, and compares the contents to the vitreous humour. One of these translucent cysts is figured in Coats' *Manual of Pathology*, and Dr. Wilks met with another example. In no case have any adhesions been found associated with these cysts. Porter describes two examples in which the mucous membrane was quite healthy, but in which the other coats were the seat of some chronic inflammatory thickening. The condition is probably identical with Virchow's "colloid degeneration of

the appendix." It is said that this curious cyst does not give rise to any symptoms, so that in nearly all instances it was only discovered on post-mortem examination. The occlusion appears always to be at the caecal end of the appendix, and it may be due to a congenital defect. I have met with one instance during life. The patient, a man of thirty, had always been the subject of constipation. Since the age of eighteen he had suffered at intervals from a vague and not severe degree of colic, described as "congested liver." He had had also a definite attack of gastritis. For some months before I saw him he had had a "heavy pain" in the right iliac region; it was worse on exertion, and extended down the right thigh and into the right testicle. It was never severe. He complained so much of this "heavy feeling," that I opened the abdomen and discovered in the pelvis the caecum and a cystic appendix. There were no adhesions. The appendix was shaped like a banana, and measured $4\frac{3}{4}$ inches in length by $1\frac{1}{2}$ inch in width. It was elastic, smooth, and quite translucent. On removal a quantity of clear, white, perfectly translucent mucus escaped from it, very much like the material which is met with in a ganglion. After the operation the symptoms vanished.

If the mucous membrane beyond the strictured spot be unhealthy—as it usually is—then the distal part of the appendix is found to be distended with muco-pus, or pus, or opaque and ill-looking and often ill-smelling mucus. These cysts may be oval, cylindrical, or round; they are usually surrounded by adhesions of varying density. The cyst wall is as a rule very thick, and the swelling may be so tense as to feel—when exposed by operation—like a stone. In size these cystic swellings are seldom large; one of the size of a walnut would be quite large: I have encountered some of considerable size which have measured as much as $1\frac{1}{2}$ inch across, but these are rare. In these cysts the mucous membrane is found to have been destroyed by ulceration. The cysts are apt to perforate and to burst; the perforation leads to an attack of perityphlitis, and the contents escape more or less completely from the appendix. If the patient recovers the perforation heals, and in due course the cyst fills up again, and bursts again; thus the conditions for repeated relapses are produced.

Sometimes the cyst ruptures, and a large rent is produced. These cases usually lead to an abscess, and if the abscess cavity heal, the patient is cured, as the appendix becomes practically obliterated. Some of the fibrous cords which are found in the place of the appendix are no doubt the result of the process here described.

It is not necessary, however, that a stricture should exist in order to produce a cystic dilatation of the appendix. The little tube may be occluded by acute bending upon itself, or by torsion around the line of its long axis. The process so deformed is held in position by adhesions, and by freeing the adhesions the lumen can be restored.

As in the case of the stricture, muco-pus or, at any rate, very unhealthy-looking mucus must inevitably accumulate in the appendix beyond

the stenosed part. The cysts produced by such accumulation are, as a rule, larger and more globular than those produced by actual stricture. I think that in the cases of acute bending or torsion the mucous membrane is probably more healthy than in the cases associated with stricture. I have met with cysts measuring 2 inches across, and on dividing the adhesions which bound down the appendix have seen such cysts empty themselves entirely. In some of these cases the little tube has been so bent upon itself as to be in the form of an acutely bent hook. In instances in which there was torsion, so slight a disturbance of the adhesions allowed the cyst to empty itself that I imagine such emptying must take place from time to time during life. It must be emphasised that in these examples there is no real stricture. The cystic part of the appendix may, however, give way by perforation, or by a more extensive bursting; but such an accident is less common than in the cases with stricture.

The subject of stricture and occlusion of the appendix is alluded to again in dealing with relapsing perityphlitis (page 45).

(d) *With actinomycosis of the appendix.*—A few examples of this rare condition of the appendix have been recorded. One of the most complete, as well as the first described, is recorded by Dr. Ransom (see page 41). The patient in this instance was a man aged fifty, in whose right iliac region a painful and tender swelling appeared. An abscess formed in due course and discharged through the skin. In the pus clumps of the actinomyces were found. The patient died. At the necropsy the abdomen was found free from general peritonitis. The vermiform appendix was contorted, and was almost buried in dense adhesions and thickened peritoneum. The cæcal aperture of the appendix was patent. The tube itself was in part dilated; its walls were irregular, and in several places communications led to an extensive abscess behind the cæcum. The cæcum was free from evident disease. The liver contained a large focus of pus, in which colonies of the ray fungus were found. Microscopic examination of the retro-cæcal abscess and of the appendix where it communicated with the abscess failed to reveal any colonies of the actinomyces. Dr. Ransom was of opinion that the appendix was the primary seat of infection, and suggested that a fragment of corn or grass bearing the parasite might have lodged in the vermiform process. (See also a case by Otto Lanz. *Vide* art. "Actinomycosis," *System of Medicine*, vol. ii. p. 81.)

C. The peritonitis.—The peritonitis, which is the basis of the affection under discussion, may be of any degree and of any extent. It may be general or local, suppurative or non-suppurative; or a localised suppurative peritonitis may be associated with a diffused non-suppurative form of peritoneal inflammation.

In the majority of the cases the peritonitis is entirely localised, and—in a less large proportion—it does not pass on to suppuration. The peritonitis is evidently due in all instances to the escape of bacterial-laden material from the appendix, or, in a few examples, from the cæcum.

It would appear that the micro-organism which is most active in the production of this particular form of peritonitis is the bacillus coli communis. Tavel and Lanz examined twenty-three cases of disease in the appendix. The examination was made either of the pus within or without the appendix, or of the exudation into the peritoneal cavity immediately around the diseased process. The material for this bacteriological investigation was obtained during the life of the patients. In three no micro-organisms were found; in nineteen the colon bacillus was found either alone or in association with other pathogenetic germs. The streptococcus was found in several cases; the pneumococcus was met with in two, but not in pure culture. The staphylococcus pyogenes citreus was in one instance the only micro-organism discovered. Hodenpyl deals with twenty-seven cases of perityphlitis. In twenty-five the bacillus coli communis was the only micro-organism found. In one case this bacillus was found in association with streptococci, and in the remaining case the streptococcus was found alone.

Many other investigators have demonstrated the same facts. I may say that the interior of the appendix of the foetus at birth has been shown to be free from micro-organisms. In the adult the streptococcus has been often found in the healthy appendix.

The bacillus coli communis exists normally in the human body, and is said to be the most abundant and the most constant of the bacteria found in the healthy man. Its natural habitat is the bowel, and it has been demonstrated along the whole length of the alimentary canal from the mouth to the anus. The micro-organism has this notable feature, that it varies greatly in its virulence. So far as experiments upon animals are of value, it would appear to be harmless when taken from the normal intestine. If, however, the bowel become the seat of almost any morbid change the bacillus becomes virulent at once. Virulence has been found in cases in which the bowel was obstructed, strangulated, or inflamed; in congestion of the intestine; in diarrhoea; in advanced constipation, and in other abnormal states. This point is of no little moment in the etiology of perityphlitis. In a large number of cases the attack is preceded by constipation, by the decomposition of undigested matters in the bowel, by diarrhoea, by exposure to cold, or possibly, although rarely, by injury. If measures could be adopted to render the bacterium non-virulent, then a great step would have been taken in the preventive treatment of this disease.

Two factors, at least, appear to be necessary to produce an attack of localised peritonitis through the medium of the appendix. The first is such a condition within the bowel as will render the colon bacillus virulent; and the second is such a lesion in the appendix as will permit that bacillus to reach the peritoneum. The invasion of the peritoneum by the micro-organism gives rise to sudden, violent, and acute symptoms; to an outbreak which is often so abrupt and intense as to produce the impression that the appendix has become perforated. It is not necessary, however, that there should be a definite and demonstrable perforation to

account for acute and sudden outbreaks of perityphlitis; in not a few of such attacks I have failed—on exposing the appendix by operation—to detect any obvious perforation.

The character and extent of the peritonitis produced will depend obviously upon the “dose” of septic material which enters the peritoneal cavity, and also upon the manner of its entrance. We must note whether the diseased appendix lay perfectly free in a normal serous cavity, or whether it was located in a pouch, or lodged in the pelvis, or surrounded by adhesions, or buried in a mass of attached omentum, or fixed to the wall of the iliac fossa. The effusion produced may be scanty or copious, serous, sero-fibrinous, or sero-purulent, or wholly purulent. It may be free from smell, but in the majority of instances it has a most offensive and often faecal odour. The least severe cases are usually associated with a little clear serous lemon-coloured fluid; the most severe are usually associated with foul pus, but in some of the fatal cases in the place of pus a thin greenish-gray fluid of an intensely offensive and acrid odour is seen. This I have found even at a comparatively late period in the case, and in instances as a rule in which general symptoms of septic poisoning were prominent. This greenish exudation is at first clear and then becomes semi-opaque. It is not large in amount.

In chronic cases a yellowish-white, soft custard-like material is sometimes produced, which is often met with in operations upon the appendix during a quiescent period; I believe it to be neither changed pus nor a residuum left by pus. In some cases I have scraped away a full teaspoonful of this matter from the appendix and its neighbourhood.

Attention may here be drawn to the curious uncertainty of the suppurative process in perityphlitis. Pus may be present in forty-eight hours, and, according to some, even at an earlier period. On the other hand, the case may progress for two or three weeks with persisting evidences of acute inflammation, and possibly with short periods of apparent improvement, but with no local evidences of pus. At the end of these two, three, and even four weeks pus may make itself evident.

Inasmuch as the peritonitis in perityphlitis is usually localised it follows that adhesions are the rule in this affection, and indeed are absent in the most acute and rapidly fatal cases only.

D. The abscess.—The abscess is in reality a collection of matter due to localised suppurative peritonitis. It is in the peritoneal cavity, but only in a limited part of it, being isolated by adhesions from the great serous space. These adhesions are formed to a large extent by adherent coils of small intestine and by attached omentum. Those who advise the very dangerous process of scraping the walls of these abscesses should remember that these walls on one side, at least, are made up of loops of intestine which have become glued together. It is necessary to repeat what has been already pointed out, namely, that an abscess round the appendix does not of necessity imply a visible perforation of that little tube; it is merely an evidence that noxious micro-organisms have found their way from the interior of the appendix to the serous membrane

which covers it. Abscesses have been found around appendices which not only are not visibly perforated, but which contain no pus, and are simply in a state of chronic catarrh.

The material in the abscess varies. There may be merely a scanty, thin, turbid, greenish liquid with a very ill odour. There may be a sero-purulent exudation. There may be laudable pus. The pus has usually an offensive smell; it may have an odour actually faecal, or it may contain faecal matter; but the last-named condition is uncommon. The most usual matter evacuated from the abscess is very ill-smelling pus of a "dirty" colour, somewhat thin, and often mixed with clots of fibrinous matter.

The quantity of pus found in the abscess varies. It is usually some three or four ounces; but it may contain some pints. In one case which had been long neglected I evacuated an abscess which contained two quarts.

The abscess cavity is apt to contain gas, the result probably of decomposition. In rare instances the gas is excessive in amount, and the swelling caused by the abscess may be as resonant as the surrounding intestines. Morton reports a case of a perityphlitic abscess from which on puncture gas only escaped, but a deeper puncture revealed pus. In one case, in my own practice, I cut down upon an iliac abscess following upon perityphlitis, and opened a large cavity containing gas, and presenting in its depths so very minute a quantity of pus that I could not help thinking that the matter might have escaped by an opening into the bowel; there was no evidence, however, of such an opening, and the cavity healed rapidly and well.

In a case reported in the *Med. News* (U.S.A., December 17, 1892) the abscess cavity contained not only gas and pus but some faecal matter also.

The relation between the size of the swelling found in the right iliac fossa and the amount of pus which is discovered in the abscess is not always direct; the swelling may be extensive, and yet the amount of pus small. The swelling is made up of the cæcum and sundry coils of small intestine which are adherent, and the walls of which are congested and cedematous. Between and around the coils are much adherent lymph, much effusion, and most probably a considerable mass of thickened and adherent omentum; in not a few instances there is also a collection of faecal matter in the cæcum. The swelling is apparently increased again by swelling in the protecting parietes, and by contraction of the muscle over it.

In the majority of abscesses which are evacuated by operation the appendix does not come into view; it is obscured and indeed buried by recent adhesions. It may, however, present itself and be found perforated or gangrenous, as a whole or in part. It may be found actually detached—as a result of gangrene of its base—and lying free in the abscess cavity. Calcareous or faecal concretions or, in rare instances, foreign bodies may be found in the abscess cavity, such substances

having escaped through breaches in the appendix wall produced by sloughing.

A perforation may be found in the cæcum. In a few rare instances this may be primary, and due to mischief starting in the wall of the cæcum, the appendix itself being sound. In the great majority of the examples, however, the perforation is secondary and is due to the abscess—which has originated in the appendix—making its way into the cæcum. The perforation under such circumstances takes place from without. In one case I met with three separate perforations of this character in the cæcum.

The perityphlitic abscess is as a rule very extensively and deeply loculated, and may even appear to be made up of several distinct collections of pus. This disposition to the formation of loculi or pockets often causes much difficulty in the healing. The secondary pouches may extend between coils of bowel, or make their way into the pelvis or into the loin.

As regards situation the perityphlitic abscess, in the great majority of instances, is situated in the right iliac fossa, but it may be found entirely limited to the pelvis on the one hand, or to the lumbar region on the other; the iliac fossa in either case being quite free. Such unusual positions are determined by unusual positions of the appendix. Fowler gives three cases in which the abscess was to the left of the median line; in one example the cæcum lay on the promontory of the sacrum, and in the other two was beneath the umbilicus. Dr. M'Callum, in a post-mortem examination of the body of a woman aged thirty, found the appendix adherent to the upper surface of the liver on the right of the gall-bladder. The appendix was obliterated by disease. There had been an abscess around it which had made its way through the lung, and had finally discharged itself through the eighth intercostal space. The abscess had healed. I have opened by operation a subhepatic abscess due to disease of an appendix attached to an undescended cæcum. In this instance the right iliac fossa was entirely free from any signs of inflammation.

The perityphlitic abscess, although primarily intraperitoneal, may make its way into the subperitoneal connective tissue; such an invasion, however, is not common. The extraperitoneal abscess, when it exists, usually occupies the lumbar region, and may extend very widely in the lax tissue of that district. I have seen such an abscess fill up the whole of the region between the lower ribs and the iliac crest.

The extraperitoneal abscess may be found on the superficial aspect of the psoas muscle, and lie distinctly behind the serous membrane. It may actually open up the sheath of the psoas muscle, and extend towards the spine in the substance of that muscle. Such cases have been well illustrated by Dr. Kelynak.

It is not at all uncommon to find that the abscess—in a chronic case—has extended upwards behind the ascending colon; such an abscess may reach the diaphragm, may perforate it, and empty itself into the

pleura or the lung. It is possible that certain of these abscesses are extraperitoneal, but I believe that in the majority of cases they are still intraperitoneal, and that they follow a course which is bounded by peritoneal adhesions.

Finally, it remains to consider in which direction the abscess will burst, supposing it not to be evacuated by the surgeon. Bull, in an analysis of 57 cases, gives the following as the result of an inquiry into this matter:—In 28 examples the abscess burst through the anterior abdominal parietes, in 15 it entered the cæcum, and in 8 the general peritoneal cavity. In the remaining 6 examples the abscess entered the thorax, rectum, and bladder, in 2 cases of each respectively. The pus may pass down the thigh, and very closely imitate a psoas abscess. It may extend in front of the hip-joint and produce symptoms akin to those of hip disease; indeed I have seen a case in a boy in which this diagnosis had been made. The pus has even made its way into the hip-joint, and in other instances has laid bare the bone of the iliac fossa. It has often made its way into the pelvis, and has produced some of the varied and manifold symptoms of pelvic abscess. Again, it has passed down a hernial sac, and made its escape through the skin of the scrotum.

ETIOLOGY.—Some features in the etiology of perityphlitis have been already indicated in the preceding section. Perityphlitis represents the very commonest variety of peritonitis, and the remarkable frequency of inflammation in this position is due to the fact that the appendix is one of the weakest points within the abdomen. It has been estimated by pathologists that in 20 per cent of the bodies examined in the post-mortem room some evidence of disease of the appendix will be found. Certainly the same cannot be said of any other organ within the abdomen.

Inheritance.—Heredity is not easy to demonstrate in a disease so common as that under consideration, but it is impossible not to be struck with the fact that perityphlitis runs often in families. I have met with a family among whose members were five subjects of perityphlitis. I have also noticed that the association of this affection in families is not so often that of parent and child as of brother and sister. This has seemed to me to be the most common coincidence.

Age and Sex.—Perityphlitis may be met with in patients of all ages. Tenger reports a case in an infant aged seven weeks. It led to a fatal peritonitis. Cases have been recorded in children respectively seven and thirteen months of age. On the other hand, the disease has been met with in patients of advanced age; one of my own patients was an old edentulous man who had his first attack at the age of seventy-two. Several cases have been recorded in still older persons. The greater proportion of the cases occur in young adults, and the period of greatest frequency is between ten and twenty.

The following table is compiled from the cases collected by Dr.

Hawkins (224 cases from St. Thomas's Hospital) and by Dr. Fitz (228 cases from general sources), the total being 452 cases :—

Age.						Proportion of cases. Per cent.
5 to 10 years	.	.	.	.	.	10·8
10 to 20 years	.	.	.	.	.	40·7
20 to 30 years	.	.	.	.	.	29·0
30 to 40 years	.	.	.	.	.	11·5
40 to 50 years	.	.	.	.	.	4·6
Over 50 years	.	.	.	.	.	3·4
						100·0

In the matter of sex the trouble is very much more common in men than in women, the proportion in the two sexes being about 78 to 22. Some writers place the relation as high as 80 men to 20 women.

Season.—Hospital statistics show that attacks of perityphlitis are more common in the summer than in the winter. Dr. Hawkins, in analysing 224 cases of perityphlitis treated in St. Thomas's Hospital, notes that 134 came under notice in the six summer months, and 90 in the six winter months. It is more common in a tropical than a temperate climate.

Injury.—Dr. Fitz, as a result of the examination of the large series of cases he had collected, considered that an injury was the cause of the attack in 10 per cent of the examples. This percentage is, I think, somewhat too high. It is not uncommon, however, to find instances in which an attack of perityphlitis has apparently followed directly upon some violence. Many cases are ascribed to a strain, to violent exertion, and to a blow. In one case under my care the symptoms immediately followed a blow on the abdomen; in another case acute symptoms began abruptly while the patient was straining to support a heavy weight. It is probable that in these instances the appendix was already diseased, and that the violence merely caused a greatly attenuated appendix wall to give way. Some of the cases in which a blow has appeared to cause an attack have been very acute, but this has been by no means invariably the case. I am not aware that exposure to cold has been clearly shown to have been an exciting cause of perityphlitis.

Condition of the alimentary canal.—An examination of cases from a clinical standpoint makes it evident that the commonest exciting cause of perityphlitis is the lodgment of undigested matter or of faecal masses in the colon. Mere constipation alone would not appear to be sufficient. It is generally allowed that constipation is more frequent among women than among men, and yet, as we have seen, perityphlitis is nearly four times more common in men than in women.

Patients who have had repeated attacks of perityphlitis often say that so long as they keep their bowels acting they can avoid an attack, but if they allow an accumulation to take place an attack may be expected. There is strong evidence to support the belief that masses of undigested food in the caecum are much more active exciting causes of

this trouble than are mere collections of what may be termed normal faecal matter.

In this connection two facts have to be specially noticed.

(a) In the first place, defective masticating teeth are exceedingly common among the subjects of this disease, and especially among those who have passed the period of youth. Over and over again it would appear as if the want of proper and efficient teeth had been the direct cause of the attacks. Such patients often bolt their food, and such meat as they eat can hardly reach the stomach in a condition fitted for complete digestion. The bolus passes into the bowel still ill digested; it fails to stimulate normal peristalsis; it is prone to lodge in the great receptacle, the caecum, where it decomposes and, if there be any existing lesion of the appendix, must tend to encourage the morbid change.

A large proportion of the subjects of perityphlitis—especially the subjects above the age of twenty—are chronic dyspeptics. They bolt their food, or their meals are irregular, or they hurry over their meals, or they begin active work as soon as the repast is finished. Many of these people have a morbid appetite; many of them are aware that an attack is generally preceded by an aggravation of the dyspeptic symptoms. One medical man, who had had many attacks of perityphlitis, informed me that he was often warned of an attack by the passage of exceptionally offensive flatus for a day or more previously. Another patient had learned that some little while before his attacks—which were of sudden onset—his urine was very thick and high-coloured.

Commercial travellers, who are in incessant movement, and whose meals are irregular, are often the subjects of perityphlitis. In other persons a first attack has occurred in connection with hurried travelling, as during a hasty Continental holiday. Indeed, the holiday season is generally very productive of cases of perityphlitis.

Certain of these patients are nervous persons, who seem to be victims of a kind of nervous dyspepsia. In an isolated case or two it would appear as if the dyspepsia which preceded the perityphlitis had been induced, or at least fostered, by excessive smoking after meals.

(b) In the second place, the history of an indigestible meal is comparatively frequent in the account of events which immediately preceded the actual attack.

Among the articles of diet which have been conspicuous in this respect may be mentioned nuts, pine-apple, coarse vegetables such as turnips and cabbage, cheese, mushrooms, mussels, haricot beans, cucumber, lobster, and so forth. When the bowel is evacuated in the course of an attack of perityphlitis, the offending substance can often be detected. In one case (in a young girl), remarkable masses, made up of partly masticated nuts, were passed for several days, during the progress of the attack. One patient was convinced that he could produce an attack by eating eggs. Many patients—especially those at or past middle life—have apparently owed an attack to the consumption of an immoderate quantity of milk.

In a very small proportion of cases diarrhœa would seem to have been the exciting cause of an attack.

In a larger proportion of cases the attack is preceded by colitis, marked by frequent loose motions, and the passage of much mucus and intestinal casts. Not infrequently this colitis has been excited by a faecal accumulation in the colon.

It has been assumed, in some instances, that a purgative has induced an attack, but more probably the actual cause was the condition which called for the aperient. I have noticed that in young women an attack is very frequently associated with the appearance of menstruation. In one case under my care four attacks out of six were thus associated.

Foreign substances.—The part played by faecal and calcareous concretions, and by actual foreign bodies which have been swallowed, has been already fully discussed (p. 8). Talamon states that, in the fatal cases, a concretion of some kind, or a foreign body, is found in 60 per cent of the bodies examined.

As already pointed out, the intrusion of foreign bodies is by no means so common as was at one time supposed.

Constitutional conditions.—*Gout.*—Dr. Alexander Haig believes "that gouty perityphlitis is extremely common, or, in other words, that nearly all perityphlitis owns this origin; and that, if all cases were at once treated by salicylates, further troubles requiring surgical procedures would be rare." Dr. Haig cites several cases in which the peritonitis yielded to salicylates, and it would appear that the diagnosis of gouty perityphlitis is mainly based upon the circumstance that relief is afforded by the salicylates. Dr. Haig's views need confirmation, and are not in accord with the common experience of medical men.

Rheumatism.—Dr. Burncy Yeo records a case (in a girl of eighteen) of symptoms of perityphlitis, associated with pains in the arms and knees. The patient had had acute rheumatism. The temperature fell and the symptoms vanished under the influence of sodium salicylate. The temperature reached 105°, the patient was very constipated, and the symptoms of perityphlitis appeared before the joint phenomena. Dr. Yeo would seem to regard the disappearance of the symptoms, when the salicylates were administered, as evidence of the rheumatic nature of the affection. There is little evidence to support the assertion that rheumatic peritonitis exists, and the nature of the alleged changes in the cæcum and appendix in this disorder has, I believe, never been defined.

Perityphlitis due to typhoid ulceration, tuberculous ulceration, dysentery, actinomycosis, and epithelioma, has been already described.

Influenza and pneumonia have been supposed by some observers to be exciting causes of perityphlitis, but no definite connection has been made manifest, and the matter rests, I believe, upon no more substantial basis than the clinical fact that perityphlitis has appeared in patients convalescent from influenza or pneumonia.

SYMPTOMS.—The clinical manifestations of perityphlitis are extremely

various, and differ remarkably in degree and duration. The attack may assume any grade, from a sudden and intensely acute diffused peritonitis, which is rapidly fatal, to an attack marked by slight pain and tenderness in the right iliac fossa, with possibly nausea or vomiting, and ending in recovery in some twenty-four hours or even less.

On the one hand, an attack which begins violently may soon subside and end favourably; on the other hand, an attack which begins mildly, and which follows a moderate course for a few days, may then develop very acute symptoms, and end fatally.

It is by no means possible to distinguish the cases which will end in suppuration from those which will not. Pus has been discovered as early as forty-eight hours from the onset of the attack; in other cases it has not been manifest until the disease has been in existence for two or even more weeks. In one case under my care the temperature remained high (100° to 102° , and at first 103°) for twenty-two days. At the end of that time the iliac swelling was incised. No pus was discovered, and the patient made a perfect recovery. It is of little service to attempt to divide the cases clinically into those which suppurate and those which do not, for the distinguishing features which should be present before the abscess is in evidence, or the case has ended favourably, are not definite enough to warrant such a classification. Some authors have divided the cases clinically into those associated with local peritonitis and those marked by general peritonitis. In the former category they have placed what may be called the average cases, and in the latter the cases which are very acute and for the most part fatal. This classification is, however, not entirely satisfactory.

The peritonitis may be local at first, and not become general until a week or even more has elapsed; and if the cases placed in this category are restricted to those in which the peritonitis is general from the onset, then the arrangement is of necessity very imperfect.

Classification.—It is not possible, indeed, to found a satisfactory clinical classification of perityphlitis upon purely pathological bases. The clinical phenomena cannot provide a sure forecast of the condition to be revealed on operation or necropsy. It is probably better to adopt some arbitrary division of the cases such as would be suggested if the clinical manifestations were regarded alone. The following classification, framed on these lines, is convenient for purposes of description:—I. An ordinary attack, the case ending in resolution; II. The case ending in suppuration; III. An attack of the mildest type; IV. A most intense and acute attack; and V. Certain peculiar forms of perityphlitis.

Relative frequency of the different varieties.—The cases dealt with under the third heading do not come—except rarely—under treatment in hospitals, and cannot therefore be treated statistically. Indeed, this class may be considered as unrepresented in hospital records. It is often conspicuous, however, in the history of relapsing perityphlitis. The cases under the fourth heading are usually attended by general peritonitis. Dr. Hawkins, in dealing with 264 cases

of perityphlitis treated at St. Thomas's Hospital, divides them into three divisions—i. Those attended by non-suppurative local peritonitis; ii. those associated with suppurative localised peritonitis; and iii. those attended by general peritonitis. The 264 cases are distributed as follows:—

	No. of Cases.	Deaths.	Mortality. Per cent.
i. Non-suppurative local peritonitis	190	...	...
ii. Suppurative local peritonitis	38	10	26·3
iii. General peritonitis	36	27	75·0
	264	37	...

General mortality, 14 per cent.

I. An ordinary attack ending in resolution.—The *general features* of an attack are sudden severe abdominal pain more or less definitely located in the right iliac fossa, nausea or vomiting, constipation, rise of temperature, the development of a tender area in the caecal region, and the formation of a tumour which is very tender, and usually dull on percussion. There is some distension of the abdomen and some rigidity of its walls. The pulse may be thready, and the tongue is furred. There is much prostration. The fever subsides in about a week, and within seven to fourteen days all the acute symptoms have passed away. The *onset* is usually sudden. The attack often comes on at night or in the early morning. In some cases of relapsing perityphlitis the attack sets in at about the same time on many successive occasions. An initial rigor may be said to be very rare, and no clinical or pathological importance is to be attached to the symptom. The patient may be in perfect health at the time of the attack, or the onset of acute symptoms may have been preceded by more or less abdominal uneasiness, by flatulence or colic with a sense of distension, by diarrhoea, or by troublesome constipation. In many cases there had been undoubted dyspepsia or a "liver attack" before the onset of the symptoms; there was a nasty taste in the mouth, the urine was thick, or the patient had felt vaguely out of sorts.

The first symptom is abdominal *pain*. In about 70 per cent of the cases this pain is localised at first just above the umbilicus, or across the belly at the level of that point. The position indicated is about that of the superior mesenteric plexus. In the remaining 30 per cent of the cases the pain is from the first definitely localised in the right iliac fossa. Should the pain be, first of all, complained of about the umbilicus, almost invariably it becomes definitely felt in the right iliac fossa in twelve to thirty hours. It is in first attacks especially that the pain is localised about the umbilicus, and in some instances it remains so located throughout the attack. I have seen cases

in which, during the first two attacks, the pain was complained of only in the upper segment of the abdomen. After the patient has had one or two attacks the pain in subsequent outbreaks is usually in the cæcal region from the very onset.

I have known a patient, who had the usual pain in the right iliac region, complain of pain and even of tenderness in a corresponding point over the left iliac fossa, and now and then this left-sided (or "crossed") pain may be more marked than that over the seat of disease.

The pain may be described as "all over" the abdomen, and may go back to the loins. It is described as "burning," "tearing," or "aching." It is very acute, and has paroxysms of greater intensity. It is not like the pain of colic, although it may be spoken of as "cramp-like." It is not of a kind to bend the patient double, nor is it relieved, except at the very beginning, by pressure. Some patients compare it to an intense attack of flatulence, and they have a notion that if they could but pass wind the pain would be better.

The pain, if severe, may produce some degree of collapse. Even in mild examples the patient feels faint, a clammy sweat breaks out over his forehead, his hands and feet become cold, and he is soon quite prostrated.

Vomiting may be among the very earliest symptoms; indeed the patient may be sick almost before the pain has made itself felt. This is seen not infrequently in children. Vomiting in perityphlitis is a symptom liable to great variation; it may be entirely absent, it may occur repeatedly, or there may be only an initial vomit. It is very rarely, indeed, a severe or prominent symptom, nor is the vomiting copious or distressing. Nausea is common enough, and a complaint of "feeling sick" is usual. Vomiting may follow the use of morphia, the administration of an aperient, or the indiscreet giving of food. I have never known the vomited matter become offensive or semi-fæulent, except in severe cases which are exhibiting septicæmic symptoms, and in which there is an extensive and probably fatal peritonitis. When the bowels are loose, vomiting is usually absent.

Constipation, more or less complete, is the rule in perityphlitis. Now and then a motion may be passed at the very beginning of the attack, the initial pain being attended with an urgent feeling that the bowels must act. This sense of tenesmus is not always attended by an action of the bowels.

Sometimes the attack is marked throughout by diarrhœa, or loose motions may be passed now and then, constipation following upon such action of the bowels. Among the 190 cases dealt with by Dr. Hawkins there was diarrhœa throughout in six instances, and in eight cases out of the 190 loose motions were passed. Thus in 7.3 per cent of the examples the bowels were not constipated. In the cases marked by constipation the bowels will often respond to an enema, or to an aperient if it be given. Speaking generally, the constipation is by no means so marked nor so obstinate as is the case in more general peritonitis.

Much tenesmus is quite rare in perityphlitis. In young patients, with acute symptoms, it may be met with as an uncommon symptom. The very worst case of tenesmus I have ever seen—worse even than in acute intussusception—was in a lad who, when the abdomen was opened by operation, was found to have a wholly gangrenous appendix.

Fever is a constant and prominent symptom.—It begins as soon as the initial collapse, if any, has passed off, and is usually of high grade. It may run up to 103° or 104° . Most often it reaches its highest point at the beginning of the case, that is, on the evening of the first or second day, and then gradually declines. This is the usual character of the chart in perityphlitis. The temperature, after subsiding a little, may rise again towards the middle period or the end of the case. These reappearances of the fever sometimes appear to be due to too early movement, or to neglect of the bowels, or to an improper diet. In other instances they cannot be explained. There is very little relation to be observed between the temperature and the local manifestations in the iliac fossa; the swelling may diminish while the fever is high or increasing; and, on the other hand, an augmentation of the swelling may be attended by no upward movement in the temperature.

The temperature may keep up for nine or ten or twelve days, and the surgeon be very apprehensive of pus. It may then subside without any evident suppuration, or any local explanation of the improvement.

The fever may continue for three or even four weeks, and be associated with no more than tenderness over the caecal region. It then disappears as mysteriously as it was maintained. In some examples, in which the temperature has kept high, and is, let us say, at 102° on the ninth or tenth day, and then suddenly drops to normal, it is probable that an abscess existed which, on the occasion of the fall in the temperature, discharged itself into the bowel unobserved. I have found a very little pus, buried in a casing of thick and rigid adhesions and indurated tissue, to keep up the temperature for many weeks.

As a rule the temperature declines gradually, but now and then it drops quite suddenly. In the majority of the cases the temperature subsides in from six to ten days.

The range of temperature observed in the cases attended with loose or regular action of the bowels would appear to be lower.

Condition of the abdomen.—According to the extent of the peritonitis the abdominal wall becomes rigid, and the skin over it hyperæsthetic. Much tenderness is complained of over the right iliac fossa.

On attempting to examine the patient in that region he complains of great sensitiveness of the surface, and the abdominal muscles over the caecal region are found to be contracted. At the outset of an acute case the rigidity of the abdomen may be well marked. In any case, however, it passes off in a day or so, and the abdomen tends to become a little distended all over. This meteorism begins in the right iliac region. A disposition to contraction in the muscles of the right side on examination continues for some time.

The tenderness in the right iliac fossa persists, and indeed is present during the whole progress of the case. It is still evident, as a rule, even when all the other symptoms have passed away, and when the patient considers himself to be well over the attack. Some tenderness on deep pressure may indeed persist for weeks after the fever and all other symptoms have subsided.

When the symptoms are acute the tenderness is somewhat widely diffused over the cæcal region, but as they subside the tenderness becomes more localised. It will then be generally found located a little to the outer side of the linea semilunaris, as it crosses a line drawn from the anterior superior iliac spine to the umbilicus.

Tenderness about this spot can often be elicited on deep pressure for weeks after an attack has quite subsided, and this symptom is a valuable one in deciding the nature of a past attack. It is not infallible as indicating disease in the appendix. I have known it to be present when the inflammatory trouble was in the ovary and not in the appendix. It is desirable in all cases to remember that the tender spot does not of necessity correspond to the exact site of the appendix. When a patient is being examined for tenderness in this region, after all the essential symptoms have passed away, care should be taken to note how deep pressure is borne over a corresponding spot on the opposite or sound side; since heavy and localised pressure over this particular region is not unattended with discomfort in persons who are quite healthy.

During the attack it is needless to say that the tenderness will vary both in degree and in extent. Its intensity is not, however, a sure indication of the degree and extent of the inflammation in the iliac fossa. There may be extreme tenderness in a case which ends speedily in resolution. On the other hand, I have discovered a large collection of pus in a case in which local tenderness had never been a conspicuous feature. I have seen two cases of septic peritonitis, due to trouble in the appendix, run their entire course with a flaccid belly wall and with scarcely any tenderness. Both patients were men over fifty, no morphia had been administered, and in both cases death took place from toxæmia within seven days. One man spent some hours in applying massage to his own abdomen, and the other drew frequent attention to the absence of tenderness by slapping the abdominal wall.

As the tenderness passes off and the abdominal wall becomes less rigid, an area of dulness can be detected in the right iliac fossa, and with it is associated a more or less definite *tumour*. Both the dulness and the swelling vary greatly in extent. The dulness has its base about the anterior superior iliac spine, and this base extends inwards along about the outer half of Poupart's ligament. From this imaginary base the dulness may extend a few inches towards the median line, or be found reaching upwards in the region of the ascending colon. It may assume a triangular outline with its apex at or about the umbilicus; on the other hand, it may reach the median line from the symphysis pubis to the navel, and form a very extensive area of dulness occupying the greater

part of the right half of the anterior abdominal area below the level of the umbilicus. Again, it may extend round into the loin. The dulness need not be absolute, nor is it indeed, as a rule, absolute in all parts, especially when the area marked out is extensive. The dulness is most evident and most complete near the base above referred to. It becomes less pronounced as the outskirts of the area are reached. There are often patches in the defined area where percussion elicits a more or less tympanitic note, and in some large part of the district the dulness may be only relative. As the rest of the abdomen is usually quite tympanitic, the affected area can be defined with little difficulty.

The dulness is caused in the main by effusion, by effusion bounded by adherent coils of intestine and usually adherent omentum, and possibly also by faecal matter in the caecum. It will be understood, therefore, why parts of the dull area may present a resonant or relatively resonant note on percussion.

The tumour is to some extent coextensive with the area of real or comparative dulness. Its base coincides with the base of the dull area above given. Its lower and outer boundaries, therefore, seem to merge into the iliac bone and into Poupart's ligament. Its upper and inner parts are more or less distinct.

Sometimes the swelling forms a definite ball, at other times its boundaries are very indistinct. It may, indeed, be no more than a sense of resistance associated with some degree of dulness on percussion.

The mass feels hard; and as the acute symptoms subside the swelling becomes more and more definite, and then may appear as a well-marked round or oval swelling above and often parallel to the outer half of Poupart's ligament.

The swelling, as I have just said, is made up—when at its height—of inflammatory effusion limited by adhesions, of adherent coils of intestine whose walls are probably oedematous, of a caecum which very likely contains a quantity of faecal matter, of adherent and greatly thickened omentum, and of a greatly swollen appendix surrounded by much effusion and lymph.

The swelling, therefore, may be wholly dull on percussion, and this dulness will always be most marked towards the base; or it may be somewhat resonant owing to the distension of the adherent coils of intestine by gas; or even, for the same reason, quite resonant. For like reasons it is often resonant in one part and dull in another, and the percussion sounds may vary in the same case from time to time.

As the case advances towards recovery the effusion is absorbed, the lightly adherent intestines are freed, the omentum shrinks, the caecum has emptied itself, and nothing remains but the diseased appendix and the more or less considerable mass of inflammatory material with which it has surrounded itself. Thus it is that the tumour becomes more and more definite as the case progresses towards recovery.

The magnitude of the swelling does not vary with the magnitude of

the case. Some of the most fatal cases are attended with but little evident swelling.

The very largest tumour—one which has reached the umbilicus on the one hand, and extended to the left of the median line on the other—often subsides without producing a drop of pus. And again, an abscess may appear in the iliac fossa without any previous swelling having been noticed. There may, indeed, be no swelling at all, as is seen especially in instances in which the cæcum and appendix are lodged in the pelvis.

When the cæcum is undescended—that is, is situated beneath the liver—the swelling is in the subhepatic region.

Often in children the swelling—when of the usual form—can be felt by the finger introduced into the rectum, and in adults it may be so felt if there be an extension into the pelvis. The iliac swelling of the ordinary type cannot, however, be felt per rectum in an adult.

Occasionally, especially when aperients have been administered, peristaltic movements may be perceived in or about the tumour.

General constitutional condition.—The patient becomes more or less prostrated by the pain, by the fever, and possibly by the slight degree of septic poisoning which may be assumed to exist. The eyes become a little sunken and the face pinched. While the manifestations are acute the countenance may be that of a patient with general peritonitis. As a rule, however, the patient's aspect is not characteristic; it can only be said that he looks ill. Headache is often complained of. All appetite is lost. The thirst is not so intense as in general peritonitis. The tongue is furred, but rarely becomes dry. A most unpleasant taste in the mouth often distresses the patient. The pulse is the pulse of fever; it is seldom affected in tension, and only in quite acute cases does it become thready. The urine is that of fever, and is said often to contain an excess of indican.

The patient usually lies flat upon the back, but is often very restless. The knees may be drawn up and the hands may be placed above the head, but this attitude is never so common as it is in general peritonitis. It is not infrequent, however, to find that the patient keeps the right thigh drawn up or wishes to have it supported by a pillow.

Occasional symptoms.—The pain at the beginning may be distinctly referred to the loin, and for the moment may be mistaken for renal colic.

The pain not infrequently radiates from the right iliac fossa. The most common direction assumed is down the right thigh upon its inner side; next in frequency is a pain in the testicle, or in the external genitals along the penis or in the perineum. Now and then the radiating pain is referred to the bladder, and micturition is frequent; or, on the other hand, there may be retention of urine; this latter symptom is, I think, more common in women than in men.

There may be much hyperæsthesia of the skin over the front of the thigh just below Poupart's ligament, or over the back of the hip, or over the renal region. There may be much stiffness of the right thigh, the limb being drawn up. In some such cases attempts to straighten the

thigh cause exquisite pain. See section on diagnosis between perityphlitis and hip disease (p. 49). Distressing pain in the lower part of the back may be complained of. The attacks may be coincident with the menstrual period, and may be associated in the patient's mind with some ovarian trouble, and undoubted ovarian pain may exist. I remember that a patient with relapsing perityphlitis complained of intense pain at the menstrual period, such pain having been unobserved before the perityphlitis appeared; in this instance I found a diseased appendix adherent to the ovary. Such adhesion may exist in other cases in which there is an association of ovarian symptoms; in one case I found—quite distinct from the diseased appendix—an ovary containing pus; this case had been considered ovarian.

Tenesmus is quite a rare symptom. Now and then peristaltic movements may be perceived in the abdomen, but in the great majority of cases all is apparently still within.

Course.—The pain remains severe, and may even show some increase during the first two to four days; it then becomes less and less marked. The tenderness, however, remains unchanged. The fever subsides in six to nine days, and all the acute symptoms are over in ten to fourteen days. In the 190 hospital cases reviewed by Dr. Hawkins and belonging to the present category, the average time during which the patient was invalided or unable to work was twenty-five days. An elongated swelling, tender on deep pressure, can usually be felt in the right iliac fossa for a long time after the symptoms have all vanished. The 190 patients all recovered. In three an incision was made, and in one of these the appendix was removed.

II. An ordinary attack ending in suppuration.—These cases, during the earlier days of the attack, follow closely the clinical manifestations just described. The onset of the attack and its principal symptoms are exactly the same. A rigor is no more common in the cases which end in suppuration than in those which end in resolution. In both sets of cases an initial rigor is very rare. Indeed, there is absolutely no feature in the initial symptoms of the attack to enable the surgeon to foretell the advent of suppuration. The attack may begin with alarming violence and end in ready resolution; on the other hand, the early symptoms may be very little marked and yet suppuration occur.

I have seen a case, which at the beginning was considered to be one of acute general perforative peritonitis, end in perfect recovery in seven days, the symptoms rapidly dwindling down to the mildest manifestations. On the other hand, a perityphlitic abscess has been discovered in a patient who has never been laid up.

Roux mentions the case of a man, aged forty-two, who complained of some pain in the right iliac fossa, but who continued with his work as a carpenter for a week, the bowels acting regularly the while. On the eighth day the pains became worse, and the patient took to his bed. On the ninth day a large perityphlitic abscess was evacuated.

The evidences upon which a suspicion of suppuration may be based are the following:—The general symptoms persist, and the local pheno-

mena—as represented by swelling, dulness, induration, and tenderness—
increase. The right thigh is very prone to be drawn up, and pain in the
thigh or in the testicle or external genitals is more common than in the
non-suppurative cases. Sometimes the pain in the thigh is very severe,
and the patients cannot bear the limb to be moved or even touched.
The temperature keeps high. It may fall to normal about the seventh
day and then rise again—a very significant symptom. Or the tenth to
the fifteenth day of the disease may be reached and the temperature still
show no decline since the commencement of the attack. The patient
now begins to look severely ill. The tongue, which has been much
coated, becomes dry and brown. The prostration increases. When pus
forms the iliac swelling is usually large, and forms rapidly. Fluctuation
can only be detected when the case is well advanced, and when the tender-
ness and the general swelling have much diminished. Œdema of the
integuments and redness of the skin are very rarely present until the
other signs of abscess are quite prominent and undoubted. Furthermore,
it is to be noted that a tendency to looseness of the bowels is more common
in the suppurative than in the non-suppurative cases of perityphlitis.

As a comment upon the above-described evidences of suppuration
the following points must be mentioned:—In the first place, an abscess
may exist as early as the third day. Pus has been discovered at the end
of forty-eight hours. Puckham mentions a case which ended fatally on
the fifth day; an abscess was found at the autopsy which contained
three pints. In the second place, pus may be present without fever,
although this combination of symptoms is very uncommon. In the third
place, the temperature may keep high for three or more weeks, and yet
no evidences of pus be forthcoming. It is possible that in some of these
cases which finally end well an abscess had burst quietly into the bowel and
healed up. Fourthly, the swelling may be extensive, hard, and tender,
and yet vanish completely away without the production of a drop of
matter. Finally, an abscess may be present in cases in which the swelling
is very insignificant. In such instances the pus may be diffused between
coils of adherent and possibly distended intestine, or may be lost to view
in the pelvis. If the abscess contain gas, it may exhibit a resonant note
on percussion over some part or the whole of its surface. As an
occasional symptom may be mentioned œdema of the right lower limb.
This would appear to be due to compression of the iliac veins by the
inflammatory exudation, or occasionally it may be due to actual throm-
bosis of that vein. Phlebitis in the lower limbs, with or without
suppuration, is not uncommon in perityphlitis, and it is curious that it
is much more common in the left limb.

In children, and less often in adults, the swelling caused by the
abscess may be felt on digital examination of the rectum.

Course.—The progress of the case is that of a deep-seated abscess.
In the thirty-eight hospital cases analysed by Dr. Hawkins the following
results were noted:—In five examples the abscess burst into the bowel
between the thirteenth and the eighteenth days. All these cases did well.

In ten cases death ensued (in four instances from intestinal obstruction due to adhesions, in one from abscess of the liver, in one after miscarriage, and in the remaining four after operation). In twenty-three cases complete recovery followed the evacuation of the abscess by operation. In one case the abscess was not opened until the seventh week.

As already stated, the abscess usually presents in the iliac region. It may, however, burst in the directions indicated in the account already given of the abscess on page 19. I have known it present in the sac of a scrotal hernia and in the inguinal canal. It has discharged through the sac of a femoral hernia. The pus may extend up along or behind the ascending colon, and may present as a lumbar abscess, and be opened in the loin. The largest perityphlitic abscess I ever evacuated was in this situation. In many instances these abscesses are actually perinephritic. The pus may extend farther up and reach the subhepatic region, and be opened or spontaneously discharge in that situation. It may go yet farther, and piercing the diaphragm may enter the pleura, or the lung. In many instances recovery has followed the natural or artificial evacuation of the abscess in this situation. The pus may make its way into the pelvis, and produce the phenomena of a pelvic abscess. The abscess may extend beneath Poupart's ligament into the thigh, and may imitate a psoas abscess, or even the abscess of hip disease. When there is stiffness of the hip-joint, and when the thigh is kept flexed, this resemblance is the more striking.

After the abscess has been well opened and drained a speedy closure of the suppurating cavity is the rule. The healing is generally complete within three to four weeks. Now and then the discharge becomes less and less, and the wound heals, and the patient is considered to be sound; but after an interval, which may vary from a few days to several weeks or even months, the abscess makes its appearance again. These relapses—if occurring at an early period—are due to the too speedy closing of the skin incision and to the resulting accumulation of matter. If the abscess reappear after an interval of weeks or months it must rank as a residual abscess, that is, as a suppurative focus in or about the residues or remains of an old abscess.

The abscess may relapse repeatedly, as the following case will show:—A lad of fifteen had a severe attack of perityphlitis in November 1892. A large abscess formed, which was incised and soon healed. In December 1892, after a period of sound health, there was a burst of pus through the well-healed scar. The opening soon healed, and the patient appeared sound. The abscess relapsed in February, April, and September 1893, after which it closed for good. Between each relapse the wound was sound and the boy well.

The perityphlitic abscess so often contains pockets and diverticles that conditions very favourable to imperfect draining and healing, and consequently to relapse, are provided by these collections. The abscess may heal several times and again relapse. In such instances it is usually

necessary to secure more efficient drainage by making counter-openings, and by opening up neglected pockets. The abscess cavity will then often heal, if it be scraped out and dressed from the bottom.

Several times, in dealing with these troublesome and "relapsing" abscesses, I have come across a loose concretion when exploring the sinus, and after the removal of the concretion the cavity has at once healed and has remained sound.

Some of these cases of relapsing abscess are extremely obstinate. I have known them to continue for years, now better now worse, now healing now breaking down; and to resist every surgical measure applied to them. Fortunately such cases are not common when the large number of perityphlitic abscesses are taken into consideration.

After a perityphlitic abscess has been evacuated it is desirable to be cautious in the prognosis. It is safe to say that the majority do well, and that relapses and troubles in healing are uncommon in children. It is rather in adults that difficulties are met with.

A faecal fistula may result from a perityphlitic abscess (page 52).

The stiffness of the thigh to which allusion has been made may persist for some time after the abscess has been successfully treated.

The œdema of the right limb also may persist for a considerable time. I have known it present for months after the abscess had entirely healed. I believe, however, that the stiffness and the œdema invariably pass off in the course of time.

For reasons which have been already explained, the patient who has had a perityphlitic abscess may be regarded as not liable to another attack of the original disease. The abscess usually removes the cause of the perityphlitis and effects a cure. I have only met with two cases in which definite attacks of perityphlitis returned in patients in whom abscess had occurred. The abscess itself, however, may give trouble, and those patients who are the subjects of "fresh abscesses" weeks and months after the original incision has closed, must be regarded not so much as the subjects of relapsing perityphlitis as the victims of an intricate abscess which has not undergone complete obliteration.

III. An attack of the mildest type.—Such an attack consists of more or less sudden pain in the abdomen, some tenderness in the right iliac fossa, a little rise of temperature, and possibly some vomiting. The patient is laid up for a few hours, or perhaps for one or even two days. He is then well, and is only conscious of some tenderness and stiffness in the right iliac fossa. Such attacks are often described by the subjects of relapsing perityphlitis. The symptoms are not severe, but for an hour or so at the onset the patient may feel very ill, and there may even be a slight degree of collapse.

The attack is often preceded by malaise and a complaint of flatulence, and even of colic. Constipation is usual, and if seen during the attack or immediately after it the tongue is found to be furred.

One patient—a man of thirty—who consulted me had had sixteen attacks of the type above described. They lasted from one to three days

at a time, and the symptoms were so mild that he was never laid up for more than an hour or so. There was no vomiting. In another case—that of a man of twenty-four—twelve attacks occurred in two years. In each attack there were the symptoms above detailed, and in each attack there was vomiting. As soon as he had been sick the trouble began to pass off; on each occasion there was a rise of temperature. The patient was never laid up for more than a few hours.

As illustrations of attacks of a somewhat severer grade the following may be selected:—

A man, aged twenty-two, when twelve years of age, had a severe attack of perityphlitis, which laid him up for three months. No abscess formed. Ever since, that is, for a period of ten years, he had had from six to eight attacks every year.

His attacks begin with uneasiness in the belly, then a very severe pain is experienced which locates itself in the right iliac fossa. This region of the abdomen becomes hard and tender, and the thigh is drawn up. There is nausea invariably, but no vomiting. The temperature rises to about 101° ; it has registered 103° . The patient has an injection of morphia and is soon easy. He lies in bed for from thirty-six to forty-eight hours, and then goes about his work, but for a day or so he has little appetite, and is indisposed to walk. The attacks are attended by constipation. Besides these major attacks, every three weeks or so he has minor attacks marked by some little pain in the right side, loss of appetite, nausea, and disinclination to move about. The attacks never lay him up and never require morphia.

A lady, aged thirty-five, who had always been subject to looseness of the bowels and some dyspepsia, had eighteen "attacks" in five years. After a restless night she would experience in the morning a sense of malaise. She would eat an indifferent breakfast, and after the meal would feel chilled, have a loose motion, and begin to feel pain in the right iliac fossa which increased rapidly in intensity. About noon or some time in the afternoon she would have to go to bed. The temperature would vary from 99° to 100° . There would be nausea, but no vomiting. The bowels would become confined, and the right side of the abdomen very tender. The treatment consisted of poulticing, abstinence from food, and the use of opium. The patient would keep in bed from two to five days. For some days afterwards the stomach would feel too tender to permit her to wear corsets. In this case the appendix was very distinctly palpable.

By some writers these short—although at the time severe—attacks, which last twelve, twenty-four, or thirty-six hours, are described as "appendicular colic." Appendicular colic was first described by Melier, who considered the pain to be due to distension of the appendix. Talamon, writing in 1890, considers that the sudden and sharp pain in the caecal region, attended by local tenderness and possibly by vomiting, is due to calculus in the appendix, and is to be compared to gall-stone colic or to the colic of renal stone. Other writers have

considered the pain to be due to an accumulation of mucus in the appendix.

All, however, are of opinion that the suffering is due to a spasmodic contraction of the organ, whether it be attempting to expel a calculus or to rid itself of an accumulation of mucus. They regard it as a real colic comparable to intestinal colic. The cessation of the pain is supposed to coincide with the emptying of the appendix or the passage of the stone into the cæcum.

A study of the pathology of the appendix makes it evident that appendicular colic has an extremely doubtful existence. The appendix itself is not sensitive; that which feels the pain is the peritoneum over it. The muscular apparatus of the appendix is feeble at its very best, and when the appendix has been long diseased it may be said to have no existence. The notion of an appendix emptying itself of an accumulation of mucus or muco-pus by such violent muscular contractions as would cause intense colicky pain is wholly ridiculous. The appendices which contain muco-pus have little trace of efficient muscular tissue left, that tissue being scanty enough in the sound organ. The idea advanced by some pathologists that the calculus enters the appendix from the cæcum is based upon a pathological error; the calculus is always formed in the appendix. Those who have examined the wall of an appendix in which a calculus has lodged could never be induced to believe that the infiltrated wall with its doubtful trace of efficient muscle could contract upon the calculus with so violent a grip as to expel it into the cæcum, and at the same time give rise to a pain sufficiently severe to produce some degree of collapse.

In short, there is no evidence, either clinical or pathological, to support the existence of "appendicular colic." The term is as ill-judged as it is erroneous.

IV. An attack of the most intense and acute type.—In these attacks the appendix is found to be perforated; or to have given way entirely at a line of stricture; or to have been burst, as it were, by a calculus; or to have become more or less entirely gangrenous from causes which have been already detailed (page 11).

It may be found quite detached.

Peritonitis is discovered in these cases to have become more or less general, and to be of an ill-conditioned kind.

The onset may be—and indeed usually is—of the degree described in dealing with the ordinary attack. It may be very severe, producing intense symptoms and marked collapse. As a rule, however, as I have said, the severity of an attack cannot be judged by its mode of onset. Attacks which begin with the most alarming symptoms may end mildly, and on the other hand, a case fatal in a few days may begin in a manner which excites no alarm. The symptoms, however, in the present case soon become marked by their severity. The temperature may run to 102° , to 103° , or higher. In the cases which present markedly septic phenomena almost from the first the temperature may not rise above

normal, and may soon become subnormal. There is often considerable vomiting with increasing collapse. Finally, there are all the evidences of general peritonitis and the general symptoms of poisoning which mark the fatal examples of this disease. Death may take place very rapidly; Earle mentions a case in which death ensued in thirty-six hours.

I saw a gentleman aged twenty-eight who, after three weeks of "dyspepsia," during which time he was actively engaged in some absorbing out-door work, took a long railway journey on a certain Saturday. He reached his destination on Sunday evening, ate a good dinner, and sat up smoking until midnight. At 2 A.M. on Monday morning—that is, two hours after retiring to rest—he was seized with definite symptoms of acute perityphlitis. At 2 P.M. on the same day when I saw him he was cold, pulseless, and dying. At 6 P.M. he was dead. Here death followed in sixteen hours. At the autopsy a diseased appendix was found to have given way.

Cases such as these must rank with examples of acute perforative peritonitis. In other instances the symptoms for several days are not notably severe nor especially alarming, but then the phenomena of acute perforative peritonitis suddenly appear and rapidly advance to a fatal termination. In such cases no doubt a gross perforation or an extensive and rapid gangrene of the appendix lights up the severer train of symptoms. I have known such a sudden accession of fatal symptoms follow the use of violent purgatives in a case which was apparently doing well.

A very large proportion of these fatal and severe cases are first attacks. Those who have had many attacks seem to be better able to bear a widespread peritonitis, or are perhaps locally protected against it to some extent by old and dense adhesions around the diseased appendix. Out of the thirty-six cases collected by Dr. Hawkins no less than twenty-seven patients died, and in all of them the phenomena at the close of the case were those of diffused peritonitis. Four of them died on the fifth day, three on the sixth, and seven on the seventh day; one succumbed on the eighth day, three on the ninth, and the remaining nine patients died at periods between the tenth and the nineteenth days. It is evident that in the cases in which death was postponed until the fifteenth or nineteenth day the peritonitis must have remained for a long time local, and only become general towards the end. In the examples of death within a week of the onset of the trouble the peritonitis was very probably general from the first.

It will be seen, therefore, that these very acute and severe forms of perityphlitis may be fitly described as examples of perityphlitis attended by general peritonitis, that peritonitis being, in many of the instances no doubt, perforative.

V. Certain peculiar forms of perityphlitis.—Under this heading may be considered—A. The masked cases; B. The chronic cases; C. The cæcal form of perityphlitis; D. The tuberculous form; E. Perityphlitis due to actinomycosis; F. Relapsing perityphlitis.

A. *Masked cases of perityphlitis.*—In these cases, which are fortunately uncommon, practically all the ordinary phenomena of perityphlitis are absent. One of the most extreme examples of this insidious form which I have met with was in the person of a middle-aged gentleman, who after being “a little out of sorts” was seized with pain in the hepatic region, attended by a rigor and subsequently by a rise of temperature. He very reluctantly kept to the house. In due course the rigors were repeated, the fever became very high, jaundice supervened, and the patient became exceedingly ill. It became evident that he was suffering from pylephlebitis. No mischief of any kind could be detected in any part of the abdomen except about the liver. The right iliac fossa had been repeatedly examined. In fourteen days he died. The liver was found riddled with minute abscesses. The appendix was utterly disorganised and filled with pus; it had evidently been the seat of long-standing disease. I can definitely assert that the patient never had a single symptom proper to perityphlitis, and yet this was the primary disease which led to his death.

In other less extreme cases there are no phenomena which are in any way characteristic or even suggestive. There are no sudden onset, no definite pain in the right iliac region, no fever, no very noteworthy tenderness, and no characteristic swelling. These patients complain of feeling ill; they are listless and out of sorts; they still attend to their business, but with effort. They complain of loss of appetite and constipation and very probably of vomiting. The tongue is furred, the belly is a little swollen, feels full, and is frequently the seat of indefinite colicky pains. There is no fever, or if there be it is of very slight degree. Possibly there is tenderness on deep pressure in the right iliac fossa. A swelling may be noted and ascribed to a loaded cæcum, the bowels being much confined. These cases go on until one day an abscess is discovered, and then the diagnosis is made.

Some of the cases met with in sickly children are very insidious and very misleading.

B. *The chronic cases.*—The chronic cases now to be considered must be distinguished from relapsing perityphlitis. In relapsing perityphlitis acute or subacute attacks follow each other in a series. They come on at indefinite intervals, and lay the patient up for varying periods. When, however, the attack passes off the patient makes a sound recovery, and between the attacks he is well. He may remain in health apparently perfect for months or even years, should the intervals between the individual attacks be so long.

In chronic perityphlitis there are attacks or relapses, but the patient is never well between these manifestations of more acute trouble. The affection appears as a chronic disease with somewhat indefinite exacerbations. It is best illustrated by a few examples. A metal polisher, aged nineteen, came to the London Hospital in April 1895. He had had his first definite attack of perityphlitis in October 1894; it came on after a severe bout of sea-sickness. He vomited and his bowels were constipated,

but he was only confined to bed for two or three days. There were marked pain and tenderness in the right iliac region. He returned to his work on the fourth day, but never felt well. The pain in the lower part of the abdomen persisted and he was always in discomfort. He got about with effort. In November he had a much sharper attack, attended again by vomiting, and associated with troublesome constipation. There were fever and much local tenderness. The least exertion brought back the pain in the caecal region, with a sense of nausea and faintness. From November until the following April he had been an invalid, and had not been able to do one hour's work. For five weeks, indeed, he kept in bed. When he attempted to get about again the pain came on in the caecal region, and he felt sick or actually vomited. The bowels were most obstinate, colicky pains were common, the belly was never free from discomfort, the tongue was coated, the appetite was poor, dyspepsia was complained of, and some fever at night was common. The patient was least uncomfortable when lying down, and for nearly five months was hardly able to leave his bed or sofa. The right thigh was kept flexed at the hip, and the right iliac fossa was always tender. The patient became wasted and cachectic-looking, and very "nervous." I removed the appendix in May, seven months after the first attack. It was buried in a remarkable mass of the densest adhesions, and was represented by a tract in the centre of this mass filled with pus, blood, and mucus.

In another case a married woman, aged thirty-one, had been confined to her bedroom for over twelve months, and had in the meanwhile been delivered of a child. She began her troubles with a definite attack of perityphlitis, and then passed into the chronic condition above described. Some slight degree of fever was nearly always to be noted at night. She was not ill-nourished, and while she kept at absolute rest in bed she had not much trouble, but the least movement brought on pain in the right iliac fossa, with nausea and malaise, and a more definite rise of temperature. Over twenty times within the twelve months the patient endeavoured to move about her room, but always with the same result. Tenderness was always to be made out over the site of the appendix. I removed the diseased organ and found it adherent and full of thick pus.

A case reported by Dr. Kelynack reveals symptoms of a graver character and more extensive mischief within the abdomen. A married woman, aged fifty-four, was admitted into the Manchester Infirmary on August 2, 1892. For no less than ten months the patient had been troubled by attacks of vomiting which occurred almost every day. No cause for such a symptom could be suggested by the patient herself, and no history of acute illness could be obtained. During the last three months the vomiting had been much worse, and she had lost weight rapidly. Two months ago she first noticed that the abdomen was distinctly enlarged. On admission she was in an extremely weak and almost collapsed condition. Vomiting was frequent. The abdomen was distended, and in greater part dull on percussion. The pain, such as it was, lay in the right hypochondrium and epigastric region. The temperature was normal. The vomiting

persisted, and the patient sank and died three days after admission. The autopsy revealed an enormous perityphlitic abscess containing several quarts of foul-smelling pus. The abscess reached to the liver, occupied the pelvis, and extended far to the left of the median line. The appendix was bound down by old adhesions and was perforated; the stomach was congested.

C. *The cæcal form of perityphlitis.*—These cases cannot be quite so precisely defined clinically as might be wished; that they are rare I have already said, and as in the majority of instances they end in complete recovery actual inspection of the parts is very rare. The account which follows is based upon an investigation of the few cases in which it was possible to demonstrate by operation that the appendix was to all appearance entirely healthy. One such case was the following:—A neurotic and dyspeptic man of twenty-eight had had several mild attacks of perityphlitis. He attached a very exaggerated importance to these outbreaks, and regarded them as desperate illnesses. He was about to leave England for a distant colony, where he would be living almost beyond the confines of civilisation, and he was exceedingly anxious to have his appendix removed before he left. The precise physical condition did not render such an operation necessary, but the mental attitude of the patient was such that it was rendered at least politic and desirable. The abdomen was opened, but nothing abnormal was discovered except a few loose adhesions about the cæcum. The appendix appeared perfectly normal, but I considered it desirable to remove it; it proved on minute examination to be healthy. The patient made a good recovery, and has never had another attack of perityphlitis.

The subjects of this variety of perityphlitis are usually dyspeptic and the subjects of constipation. They often have imperfect teeth, and bolt their food. They often pass scybala. They are troubled with flatulence. The attacks may come on after a definite error in diet or an unusual neglect of the bowels. Not a few of the patients appear to have a chronic form of mild colitis and pass much mucus.

The attack comes on gradually rather than violently and abruptly; the pain at the outset is not at its worst, but becomes gradually more and more severe. The symptoms are loss of appetite, coated tongue, and, possibly, vomiting, with fever in slight degree. The tenderness in the right iliac fossa is somewhat diffused, and some swelling is to be discovered, as a rule, almost from the first. This mass can often be made out to be a faecal collection in the cæcum. The stools which are passed after the attack are most offensive, and contain scybala. The breath is offensive. The attack, which is of a mild character, passes rapidly away, and, save for some soreness in the right iliac region, in a few days the patient is well.

Now and then the subjects of many of these slight attacks affirm that indulgence in certain articles of food or neglect of the bowels will precipitate an attack. I am aware that such conditions are not conclusive evidence that the mischief has its origin in the cæcum, but the circum-

stance has been noteworthy in instances within my own experience in which the appendix was demonstrated to be free from disease.

The attack is certainly not always of this mild character, and may assume the features of an ordinary perityphlitis. One such case—in a young man aged nineteen—is detailed on p. 6. Here the symptoms of the attack were of the ordinary type. There was nothing to suggest that the cæcum was primarily at fault. An abscess formed, and on its evacuation it was made evident that the cæcum was at fault while the appendix was healthy.

On the other hand, mild attacks of the character just described as common in the cases of cæcal origin may be met with in association with definite disease limited to the appendix.

The admission, therefore, has to be made that perityphlitis of cæcal origin may be suspected, but cannot be certainly diagnosed from the clinical manifestations alone.

D. *The tuberculous form.*—The symptoms of tuberculous perityphlitis may be of the ordinary kind, and may present no especial and distinctive characters. In a certain number of instances, however, in which I have demonstrated the condition on operation the symptoms have been of an insidious and chronic character. The following case may be taken as a type of the examples now under consideration :—

A lad of nineteen, a member of a tuberculous family, was admitted into the London Hospital with the following history. He had always been thin and delicate. He had been ill for nine months. Before that time he was able to lead an active life. Nine months ago he began very gradually to be troubled with colic, and to have a more or less constant uneasiness in the abdomen. Diarrhœa became a conspicuous symptom, and some tenderness and dulness were discovered by his medical attendant in the right iliac fossa. During the nine months he was quite an invalid; sometimes better, sometimes worse. He was confined to his bed for weeks at a time, and never left the house until he came to the Hospital. He had wasted, his appetite was poor, food gave him pain, he was occasionally sick, his tongue was red and raw, and there was continual abdominal uneasiness; this, which now and then amounted to severe pain, was in the right iliac fossa, where there was always a tender area. He had diarrhœa, attended by much mucus, but now and then there were periods of constipation. There were no rigors, but always some fever, with, at last, flushings and sweating as in hectic. Indeed, he presented, on admission, the general phenomena of hectic fever. There were no signs of tuberculosis in the lungs. The abdomen was not swollen, and there was no ascites. The right iliac region was tender; in it could be felt a vague resisting mass, which was resonant in a modified degree on percussion, and which was described in my notes as “feeling like a cæcum made of leather.” Near it were two round lumps in a line, each lump being about half an inch in length. They were considered to be concretions in the appendix, but they proved to be enlarged and almost calcareous tuberculous glands. I performed abdominal section, and found

a caecum with greatly thickened and leathery walls studded with tuberculous nodules. The omentum was adherent to it. The appendix was apparently normal, but it exhibited tuberculous changes on incision. There were many tuberculous glands besides those mentioned. There was no tuberculous infection of the peritoneum. The trouble, indeed, was almost entirely confined to the caecum.

In another case, also in a young man, the patient had experienced a very similar chronic illness, with symptoms almost identical. In addition, however, he had had several attacks of a subacute character, which were always regarded as due to mischief in the appendix. There was a large area of dulness on the right iliac fossa, with tenderness and abiding fever. On opening the abdomen I found the caecum and appendix buried in a mass of adhesions and studded with tuberculous nodules. The infection had spread to the general peritoneal cavity, and had evidently extended from the caecal region as from a centre. The appendix was apparently much enlarged, but the extent and density of the adhesions, and the fact that the organ was lying on the iliac vein, prevented me from removing it. There was some ascites. The patient made an unexpectedly good recovery, and when heard of, some two months after the operation, was reported as "a great deal better."

E. *Perityphlitis due to actinomycosis*.—The best-recorded case of this rare condition is that detailed by Dr. Ransom, and already alluded to (page 14). The patient was a man of fifty. His illness began on 12th October 1888 with severe but somewhat indefinite abdominal pain. He continued to get about until 21st October, when he was seized suddenly with defined pain in the right iliac fossa. On examination, one hour after this acute onset, Dr. Ransom found in the caecal region a firm, uneven, solid mass, tender on pressure. The patient gradually improved, and was able to get up on 18th November. On the evening of this day the temperature rose a little. The swelling increased, and involved the whole iliac fossa, extending upwards to above the iliac crest. There was great local tenderness. The temperature varied greatly, rising sometimes to 102.8°F . The pulse ranged from 84 to 90. On 5th December he was again suddenly seized with severe pain in the caecal region, which also extended down the right leg, and it soon became evident that there was thrombosis of the external iliac vein. On 9th December pus was suspected, but aspiration revealed nothing. The swelling increased, and the right loin, buttock, and the upper part of the right thigh all became much swollen. On 14th February an abscess pointed and burst. About an ounce of thick, dirty pus with a faecal odour was discharged. The patient was relieved. Faecal matter was discharged from the wound. On 20th March more pus was liberated from the wound. The patient did not improve. He became gradually worse, and died on 21st June.

In one case, which I had an opportunity of seeing early, the patient, a middle-aged man, had the same equivocal symptoms at the commencement. He did not begin with a definite sudden attack. There was a considerable swelling in the right iliac fossa, and as the phenomena of inflamma-

tion were not of a degree corresponding to the size of this swelling, there was a strong suggestion that the mass was a growth. Any surgeon would have hesitated between the diagnosis of a growth about the cæcum and very deep-seated pus surrounded by a considerable mass of adhesions. The patient had been losing energy and strength for some time before the swelling in the right iliac fossa appeared [*vide* art. "Actinomyeosis," *System of Medicine*, vol. ii. p. 81].

The local swelling would always seem to be a very early symptom, and to be out of proportion to the subjective symptoms.

F. *Relapsing perityphlitis*.—This name is conveniently applied to cases in which the patient has many separate attacks of perityphlitis. About the attacks themselves there is nothing in any way noteworthy. The determining clinical feature is that the attacks are repeated. Perityphlitis constituted by a single attack is more common than is the relapsing form. Dr. Hawkins, in dealing with the histories of 250 cases, found that in 23·6 per cent there had been more than one attack. Fitz calculates that recurrence is met with in about 44 per cent of the cases, and I am under the impression that this higher percentage is the more nearly accurate. Age has no concern in favouring recurrences, and there is nothing about the first attack which makes it possible to foretell whether there will be any relapse.

In relapsing perityphlitis the patient is practically well between the attacks. In this respect the condition differs from that described as chronic perityphlitis, in which the patient is never free from more or less discomfort, local or general (p. 37).

The individual attacks may be of any degree; they may be very severe, they may be of the type described in the above account as "ordinary," or they may be of the mildest possible character. Any one attack may lay the patient up for months on the one hand, or be so trivial on the other as to merely cause him to rest for a day. After many attacks one may occur which ends in suppuration. As already stated, when once an abscess has formed there is seldom a genuine relapse. The abscess may give trouble, may seem to heal, may break out again, and heal again once more to burst forth; but these relapses are not definite attacks of perityphlitis, they merit the name rather of relapsing abscesses.

The number of the attacks, the intervals between them, and their relative gravity vary in an extraordinary manner. A patient may have fifty attacks in five years. There may be fifteen attacks, or even more, in twelve months. Such frequent attacks are of course trifling in severity. On the other hand, ten years may pass by with but three attacks, of which one may be severe and two trifling. The infinite variations met with in relapsing perityphlitis may be illustrated by the following case:—The patient was a middle-aged man. His first attack was in 1874, and was very severe. There then followed a series of trifling attacks that laid him up for one to three days only. In 1877 he was the subject of a very grave attack, and was laid up for four months.

In 1878-79-80-81 and 1882 he had numerous trifling attacks, which were annoying rather by their frequency than by the distress caused by the individual outbreaks. The patient was then entirely free from his old trouble for five years. In 1888 he began again to have slight attacks: they occurred every few months or weeks, and on each occasion he was confined to his bed for from one to three days. In October 1893 he had another severe attack, and was confined to bed for four weeks. In November I removed the appendix. This patient had therefore been troubled with relapsing perityphlitis for nineteen years, during which time he had had three severe attacks and countless trifling ones.

At the operation, on account of the considerable amount of thickening which was to be felt in the iliac fossa, the incision was made in the median line. There were extensive adhesions, and much omentum was cut away. The tip of the appendix—greatly thickened—was adherent to the cæcum. When it was freed two perforations in the cæcum were discovered which were closed by sutures. Behind the cæcum a cavity was discovered filled with a custard-like substance. This collection extended as far down as Poupart's ligament. To the wall of this cavity the ileum was adherent. The cavity was scraped out and dusted with iodoform. The operation lasted one hour and a quarter. The patient made a sound and speedy recovery.

In other instances the patients have had three severe attacks in twelve or eighteen months, each attack being more grave than the one which preceded it.

It is common to have a relapse very soon after an attack, especially after a first attack. These examples, however, do not strictly belong to the present category; literally they represent a relapse of the original attack from which the patient had never entirely recovered, and they are often due to indiscretion in diet, or to premature moving about after confinement in bed.

Sometimes the recurrent attacks in women are coincident with the appearance of the menses.

Between the attacks the patient is usually well; but he is probably constipated and liable to dyspepsia, and deep pressure in the right iliac fossa usually elicits some tenderness; other patients have slight attacks of colic; a few complain of a weakness about the right groin, or there is actual discomfort in the right iliac fossa, noticed especially after exertion, which may prevent them from walking far. Not infrequently there is an uneasy catarrh of the bowels, and considerable quantities of mucus may be passed together with intestinal casts. Often there is evidence that the muscular movement of the cæcum is embarrassed; probably by adhesions which interfere with the normal peristalsis. In such cases the cæcum may be found distended with faecal matter, or it may be empty and much distended with gas, or gurgling may be evident upon pressure over it. The patient is aware of some uneasiness in the caecal district.

A condition of hypochondriasis is not uncommon in relapsing peri-

typhlitis, especially in men. They become absolutely absorbed in their symptoms, which they greatly exaggerate, and which they are perpetually endeavouring to interpret. They have—or profess to have—a consciousness of intestinal movements, which can only be described as supernatural.

Very commonly in the relapsing cases the diseased appendix can be felt between the attacks as a more or less distinct, firm, fixed and tender body. When it can be readily felt it is safe to predict that the patient will have another attack; when it is not only readily felt, but is also habitually tender and the seat of discomfort, it is safe to predict that it contains pus.

A little care must be taken to identify the appendix in these instances. Deep pressure with the tips of the fingers in the iliac region in these cases often appears to promote localised contraction of the muscles of the parietes. Such contraction may simulate a deeply-placed substance about the size and length of the little finger, and having a nearly vertical position. The muscular bundles which can effect this imitation belong, I think, usually to the external oblique muscle, but may be represented by the outermost fibres of the rectus. It is well, therefore, to be suspicious of an appendix which is felt as a rounded rod and which is vertically placed. I was first made aware of this condition in a case of relapsing perityphlitis in which I had diagnosed an enlarged appendix so placed. When I came to operate I found the situation I had indicated free from disease; the cæcum and the ulcerated appendix were deep in the pelvis and far beyond reach from the surface.

I have also mistaken a roll of adherent omentum for a diseased appendix, and enlarged glands for an appendix containing a concretion or presenting great distension of its walls. A supposed appendix has, on operation, turned out to be a little mass of hard fæces in the cæcum.

In one case of relapsing perityphlitis, which I was carefully watching, the appendix became very evident during the attack, and remained palpable for some weeks after the patient was perfectly well again. In time, however, it became impossible to feel it, even on the most careful examination. On one occasion I was examining the patient at a time when she appeared to be in perfect health, and I was surprised to discover the appendix, which had long vanished, again in evidence. The next day it was very much larger, but the patient was still quite well. On the third day another attack of perityphlitis set in suddenly and acutely.

The condition presented by the appendix in these cases varies greatly, and it is impossible from the symptoms to forecast the morbid appearances to be discovered on operation. In cases in which the attacks have been very severe the appendix has been removed with the greatest ease, and has exhibited comparatively little morbid change. On the other hand, I have found in patients who have had mild attacks an almost rotten appendix surrounded by adhesions of the densest kind.

In one instance in which the attacks had been very acute I found a long appendix with a perfectly free lumen, but bent upon itself to a right angle by some few adhesions.

Again, in patients whose attacks had been so slight as to make the justifiability of any operation a matter of question, I have found the appendix almost impossible to remove.

I have removed the appendix in relapsing perityphlitis during an interval of apparent health over 150 times since I first introduced this particular operation in 1887. The condition found in these cases is tabulated as follows:—

	Per cent.
Appendix stenosed and the distal parts dilated	30
Appendix bent upon itself and the distal parts dilated and much ulcerated	15
Appendix constricted or bound down by adhesions, and the distal part dilated and much ulcerated	8
Appendix twisted upon itself and the distal part dilated	4
Appendix buried in a mass of dense adhesions, and extensively diseased or partially destroyed	16
Appendix occupied by a concretion	15
Appendix little changed, and exhibiting only the phenomena of ulceration	4
Appendix ulcerated and perforated with an abscess outside its walls	8
	<hr/> 100

It would appear as if, in the majority of cases, the attack is due to distension of the appendix behind a stenosed or occluded point. This distension reaches a certain maximum and an attack is the result; the tube then possibly empties itself by perforation or by the restoration of the canal, and this intermittent distension, repeating itself, explains subsequent attacks.

The dilated appendix need not, however, empty itself, for I have often found in exposing the process during a quiescent period that it is so distended as to be as hard as a stone.

DIAGNOSIS OF PERITYPHLITIS.—There are certain symptoms which, at the very outset of the trouble, are common to nearly all acute disorders within the abdomen in which a sudden and violent impression is made upon the great abdominal nerve-centres. These symptoms consist of intense and sudden pain in the abdomen, of collapse in varying degree, and of some vomiting. At the very outset such conditions as perityphlitis, renal and gall-stone colic, twisting of an ovarian pedicle, torsion of a movable kidney, general peritonitis, and intestinal obstruction have been confused one with the other. This confusion, however, is seldom long-abiding. In a little while, often in a few hours, distinguishing symptoms make their appearance and the diagnosis is established. When, however, these distinguishing symptoms are ill marked, and when imitative symptoms appear in their place, confusion is very possible.

Perityphlitis and *renal colic* have been many times confused. The pain in perityphlitis may be referred to the loin, and when the inflamed appendix is situated in front of the kidney there may be tenderness over the renal area. In perityphlitis the pain may extend to the external genitals (not usually to the testicle) and to the bladder. There may be frequent micturition. It is especially to be noted that this extension of the pain is not common quite early in the attack.

In renal colic—as compared with perityphlitis—the pain is very intense and is apt to persist without variation. It runs almost at once down to the groin, testicle, and bladder. The bladder is frequently irritable. The urine contains blood. The testicle may be retracted. There is no fever. Vomiting is not a common feature. The pain often ends suddenly. There may be previous symptoms suggestive of renal stone.

Tenderness, if present, is more marked when the examination is made over the dorsal aspect of the kidney than over its abdominal aspect.

In *gall-stone colic* the following features may be noticed which should distinguish the condition from an attack of perityphlitis:—

In gall-stone colic the pain is very sudden and a rigor is not uncommon; the vomiting is usually more severe; there are pains or “spasms” in the stomach or referred to the stomach, and pains which radiate to the scapular region or to the shoulder. There is often tenderness over the gall-bladder. There may be jaundice. The history of the case and the age of the patient may give some guidance. Much importance must attach to the fact that the right iliac fossa is clear both of tenderness and swelling. The gall-bladder, however, may find its way into the right iliac fossa. In the case of a woman aged thirty, at the London Hospital, I found in the situation of the appendix, and reaching down to Poupart’s ligament, a banana-shaped swelling which was movable, which had a distinct lower end, and which appeared to be about three-fourths of an inch broad and three inches long. The patient had never had jaundice, but she had had three attacks of “gastritis.” The case was sent in as an example of disease of the appendix. The tumour proved on operation to be a distended gall-bladder containing three very large stones.

Perforation of an ulcer of the stomach has been diagnosed in a case in which perforation of the appendix led to sudden and intense pain, with collapse and subsequent vomiting; the pain being seated, as is not uncommon in the early stages of perityphlitis, above the umbilicus. In one case of this kind, in which I was called upon to open the abdomen over the stomach, the patient—a woman—had had in previous years an ulcer of the stomach. The first matter vomited was said to have contained blood, and all pain was complained of above the umbilicus. When the patient was under the anæsthetic I detected a little dulness and resistance in the right iliac fossa, and an incision made over it revealed an almost gangrenous appendix perforated at its base.

Typhoid fever.—I have met with several instances in which perityphlitis had been mistaken for typhoid fever, but only one instance in which genuine typhoid fever was mistaken for perityphlitis.

It is needless to say that the phenomena of typhoid fever are liable to considerable variation, that the fever may be attended by peritonitis in the right iliac region, and that there may be perforation of the bowel in that quarter. Sir Wm. Broadbent, in his account of typhoid fever in Quain's *Dictionary of Medicine*, says that "he has known several instances in which patients have *walked* into the London Fever Hospital with perforation." The patient with typhoid fever may suffer, indeed, so little depression of strength as to keep about and follow his usual avocation until a late period of the attack. Perforation in such cases may not unreasonably be attributed to mischief in the appendix.

On the other hand, the cases of perityphlitis which may imitate typhoid fever are those in which the advent of the symptoms is not abrupt, in which the progress is insidious, and particularly in which septic symptoms are in evidence. Very often there are misleading features in the patient's history. In one case the patient had been nursing a sister with typhoid fever, and was confident that she had contracted the disease. In many examples of perityphlitis there is diarrhoea, and, if so, another element is added to the resemblance of the two complaints.

In discriminating between the two affections stress must be laid upon the following features in typhoid fever, features which are not met with in the appendix affection. The onset of the fever is slow, and there is much malaise during the period of invasion; yet this is not inevitable, as the invasion may be abrupt. The course of the fever is very characteristic when it is well marked. The tongue is seldom imitated in perityphlitis. Finally, in the infective fever are to be noted the peculiar stools, the enlarged spleen, and the rose spots. Vomiting is not common in typhoid fever, and the amount of local tenderness is very rarely extreme.

Colitis or *membranous colitis* may present some resemblance to perityphlitis, especially when the caecum and ascending colon are conspicuously affected. The trouble manifests itself by periodical attacks alternating with moderately good health. The attacks may last a few days or a few months; they may come without reason, or may follow indiscretions in diet, constipation, fatigue, and cold. They are constituted by abdominal pain and tenderness over the affected part of the colon, vomiting of a mild degree, depression, and the passage of loose motions containing much mucus or "shreds," or "casts," or even blood. Unlike perityphlitis the onset is not sudden, the pain is not severe, and is more like that of colic; the tenderness is slight and is diffused; the temperature is seldom raised, and the motions are characteristic.

Intestinal obstruction.—In a great many instances perityphlitis has been mistaken for acute intestinal obstruction. An operation has been performed to relieve the obstruction, and a diseased appendix has been discovered. On the other hand, it is comparatively rare for actual intestinal obstruction to be mistaken for perityphlitis.

In acute intestinal obstruction—as compared with perityphlitis—the pain, as a rule, is more acute, and is apt to produce a marked degree of collapse. There is greater prostration, the abdomen becomes more rapidly distended, vomiting becomes much more copious and more persistent, the temperature is rather below normal than above it, and localised tenderness in the abdomen is usually absent.

In children acute intussusception may bear a close resemblance to perityphlitis. The pain is often confined to the right iliac fossa, and in this situation a lump can easily be felt. Moreover, I have noted marked tenesmus in acute perityphlitis in children. In the differential diagnosis the following points should be noted:—In acute intussusception the pain is rather that of severe colic, and is often relieved by pressure. Fever is uncommon, and the temperature is often below normal. The tumour which may be felt in the right iliac fossa is well defined, and is above all movable; it is apt also to change its position. In intussusception vomiting is much more marked, and moreover there are in this disease the two conspicuous symptoms of blood-stained stools and continuous tenesmus. The tenderness in the right iliac fossa is not so pronounced in intussusception, and may indeed be absent; in any case it bears no relation to the size of the swelling.

Pelvic peritonitis.—The appendix may be lodged in the pelvis, and, when diseased, may produce definite localised pelvic peritonitis. The circumstances of such occurrence may lead to an error in diagnosis. As an instance I may mention a case in the London Hospital, in which perityphlitis, due to disease of an appendix lodged in Douglas' pouch, supervened four weeks after a severe confinement from which the patient at the time had hardly recovered.

Tuberculous peritonitis.—This disease may present a very close resemblance to perityphlitis, especially to the chronic cases. As an instance the following example may be given:—A sickly-looking lad of thirteen was admitted into the London Hospital with this history—he had pain in the abdomen, with occasional sickness and obstinate constipation. He declared that the pain came on suddenly some months previously, that there was a tender swelling in the cæcal region, and that he was sick. He went to bed and his condition soon improved, although he had never felt quite well. As soon as he attempted to get about again the inconvenience in the right side returned, and although he did not actually take to bed again he moved about with constant discomfort. He was thin, and in the right iliac fossa a considerable, ill-defined, tender lump could be made out; it was dull on percussion. The belly was a little swollen, and the seat of a general and constant uneasiness. There was slight fever. He vomited now and then, and there was most obstinate constipation.

An exploratory incision revealed a localised tuberculous peritonitis with evidences of extension over the general serous surface, and with an apparently sound appendix.

Very often in the cases in which tuberculous peritonitis begins in

the right iliac fossa the appendix is diseased, and the case is a genuine one of tuberculous perityphlitis.

Cancer of the cecum may produce perityphlitis by the production of a perforation, and upon this an abscess usually follows. The onset, however, is seldom acute; the swelling and some intestinal disturbance precede the acuter phenomena. There is seldom much fever. The patient is wasting and has been out of sorts for some time.

Hip disease.—It is remarkable that perityphlitis in children may—for a time at least—resemble hip disease. I have seen many such cases. Yet I have never seen or heard of a single instance in which genuine hip disease had given rise to a suspicion of perityphlitis. In the majority of the cases of perityphlitis which have given rise to a suspicion of hip disease there has been an abscess, but this is not invariable.

The cases in which a resemblance to hip disease is marked are the following:—The patient, usually a child, is seized with pain about the right hip bone, and associated with this there is considerable hyperæsthesia of the skin. The most tender place is usually in the thigh some little way below the anterior superior iliac spine. The hyperæsthesia may be on the inner side of the thigh. The surface may be so tender that the patient cannot submit to an ordinary examination of the hip, and calls out if the part be merely handled. The pain may run down the thigh to the knee, and be severe in the knee. This extended pain down the limb may be present without the hyperæsthesia just alluded to. The thigh is kept flexed a little on the pelvis, and there is some lordosis. The patient cannot bear the limb to be moved, and usually holds it with both hands when the bed is approached. At the same time there is fever and malaise, and the patient looks anxious and ill. The bowels may be regular and there may be no vomiting.

It is no matter of surprise if such a case be regarded as one of acute hip disease. The diagnosis, however, soon becomes apparent, and very often an abscess in the right iliac fossa makes its appearance, and directs attention to the real seat of disease. During the time when the features are not like those of acute hip trouble, the discovery of a vague swelling in the cæcal region does not of necessity clear up the diagnosis.

Perinephritic abscess.—If the abscess due to perityphlitis make its way into the connective tissue around the kidney it is of course actually perinephritic. If it be still intraperitoneal, however, it may be so placed in the region of the kidney as to suggest its origin in that gland. There are, moreover, certain possible symptoms in perityphlitis which may give rise to a suspicion of kidney mischief; these are a pain extending from the right side of the belly down to the bladder, or the external genitals, or the inner side of the thigh; and among the phenomena attending such pain may be frequency of micturition. The thigh may be kept drawn up. The patient may have passed gravel.

I have operated upon a case in which there had been severe attacks

of pain without either fever, vomiting, or apparent swelling in the cæcal region; but each attack was attended by intense hyperæsthesia of the skin over the renal region. I discovered a strictured appendix full of mæco-pus, situated entirely behind the cæcum and adherent to the iliac fascia. The cæcum was above its usual level.

Psoas abscess.—The difficulty of distinguishing between a perityphlitic and a psoas abscess may be considerable. The spinal abscess may occupy the iliac fossa on the one hand, and the abscess from the bowel may exactly occupy the position of the psoas muscle on the other. In the latter instance there may be retraction of the psoas muscle, the thigh being drawn up. There may be great pain in straightening the thigh, and pain in the back.

As a rule the circumstances of the case are sufficiently distinguishing. In the spinal abscess there is no history of sudden abdominal pain nor of intestinal trouble. In the perityphlitic abscess there is no associated rigidity and deformity of the spine.

These distinguishing points are, however, not always clear, and I have met with cases in which a right diagnosis was very hard to attain.

Other conditions.—Troubles in the appendix may be confused on more or less reasonable grounds with inflammation of the ovary, or with inflammation and suppuration of the Fallopian tube. Such confusion is the more likely in those examples of perityphlitis in which menstruation appears in some way to be associated with the attack.

It is said that a twisted floating kidney and a pelvic hæmatocele have been the causes of errors in diagnosis in respect of perityphlitis.

I have known a distended bladder in an elderly lady with undoubted perityphlitis to be mistaken for peritoneal effusion. There was no suspicion that the bladder was not empty, and the swelling which already existed in the right iliac fossa was supposed to be extending across the middle line; the dulness in the cæcal region being continuous with that due to the distended bladder. It should be remembered that retention of urine is common in these cases, and that the peritoneal effusion rarely extends beyond the median line.

Symptoms not unlike those of chronic or relapsing typhlitis may be due to extensive adhesions in the cæcal region. Such adhesions may cause attacks of colic and temporary obstruction which bear a resemblance to perityphlitic attacks. Very commonly these adhesions have been induced by an actual perityphlitis of ancient date; in one such case, which I explored by operation, I found numerous adhesions involving the ileum and omentum; but the appendix was converted into an inert fibrous cord.

COMPLICATIONS.—*Pylephlebitis and hepatic abscess.*—This is, fortunately, by no means a common complication. Fitz notes 11 instances of mischief in the liver in 257 cases of perityphlitis, but, generally speaking, the proportion is very much too high. I should think that the

probability of such a complication may be more nearly represented by 0·5 per cent. The trouble, when it occurs, is due to an infective thrombosis which involves the superior mesenteric and portal veins and spreads from the seat of disease to the liver. The liver becomes dotted over with minute specks of necrosed tissue, and later with multiple small abscesses. It is a species of pyæmia limited to the portal system. A few examples have been recorded in which the infection extended beyond the liver and led to abscesses in the brain and lung.

The thrombosis may implicate the splenic vein, and an abscess of the spleen may result. It would appear that an embolus may be carried from the vessels of the diseased appendix, and may lead to a solitary abscess of the liver, without any thrombosis of large radicles of the portal vein. In such instances the pus in the abscess is usually very foetid.

Dr. Payne has shown that infective thrombosis of the superior mesenteric and portal veins may result from ulceration of the mucous membrane of the appendix without any peritonitis, that is, without any signs of perityphlitis. Dr. Jancway has recorded a similar case. I too have met with such a case clinically, and mentioned it on page 37.

The symptoms of pylephlebitis are very marked, and can scarcely be misinterpreted.

I have opened the abdomen by operation in a case of pylephlebitis following typhlitis in a girl of fifteen. The symptoms were very pronounced, and the patient's condition apparently hopeless. The liver surface was dotted over with the innumerable yellow specks described by pathologists. The patient made a good recovery. The case is recorded in my Lettsomian Lectures on "Peritonitis," *Brit. Med. Journ.* February 3, 1894.

Pleurisy or pneumonia, mostly of the right side, may be expected in about 1 per cent of the cases of perityphlitis. These lung complications are therefore not so common as in other forms of peritonitis. In acute peritonitis considered generally lung complications may be expected in about 17 per cent of the cases.

Pulmonary embolism from thrombosis of the pelvic veins has been recorded as occurring on the fifth day after operation for perityphlitis (Roux).

Thrombosis of the iliac vein on the right side may occur. This also has led to pulmonary embolism. Œdema of the right leg may occur without thrombosis, and be due to the pressure upon the vein of the inflammatory exudation about the cæcum. I have met with four cases in which œdema of the left leg appeared after perityphlitis. No explanation of this symptom was forthcoming; it did not last long.

Fatal bleeding has occurred from a perityphlitic abscess after it has been opened. The hæmorrhage is from the deep circumflex artery and from the iliac vessels (Bull).

Intestinal obstruction of an acute character may be produced by strangulation, by adhesions, or even by an adherent appendix itself. It has resulted also from the kinking of an adherent coil. After the evacuation

of a perityphlitic abscess subacute obstruction may be due to kinking of the bowel, which, being adherent to the inflamed mass, was bent upon itself when the mass contracted after operation. The gut involved in these cases is usually the sigmoid flexure.

Symptoms of chronic, partial, or occasional intestinal obstruction, extending over months or years, may follow from adhesions which implicate the coils of the lower ileum. In one case in which I operated the coils of the small intestine were matted together in inextricable confusion. The patient had been liable for years to attacks of colic with some sickness. There was constant uneasiness in the right iliac fossa, with rumbling and gurgling in that situation, and occasional evidence of enlarged coils of bowel in uneasy movement.

Inflammation of the parotid gland has been reported as a rare complication. It is most common about the end of the second week.

I have met with one instance in which *acute epididymitis* occurred on the third day of a severe attack of perityphlitis. There was positive evidence that the urethra was free from disease at the time.

Fæcal fistula.—A fæcal fistula may result after a perityphlitic abscess. It is most usually associated with a sinus in the skin in the right iliac region, and communicates with the cæcum.

The fæcal sinus has been in the loin, at the umbilicus, and even at the bottom of a hernial sac. The fistulous tract may be internal, and extend between the cæcum and the rectum or the bladder. A bladder fistula is very rare.

The fæcal fistulas now under discussion are apt to be long-abiding. They may continue for months or years, but in general terms it may be said that they show a disposition to close, and that in the course of time the great majority do close. On the other hand, they are exceedingly difficult to deal with by operation.

Hypochondriasis.—I have said that a subject of relapsing perityphlitis—usually a man—will be met with now and then who has become quite melancholic on the subject of his disease, or at least to be hypochondriacal upon the state of his intestines.

Such patients devote themselves with a morbid ardour to the examination of their disorders, they are the subjects of remarkable and inexplicable symptoms, and are the recipients of an incredible variety of drugs.

Mortality.—The precise risk to life of perityphlitis is a little difficult to estimate. The statistics available are hospital statistics, and the cases of slight degree do not find their way into hospital wards; whereas the serious and the neglected cases are sure to be very fully represented. It is probable that the mortality of perityphlitis, taking all phases of the disease together—the most trifling attacks with the most serious—is about 5 per cent.

Hospital statistics from which the slight attacks have nearly all to be eliminated give a much higher death-rate. Dr. Hawkins deals with the circumstances of 264 cases admitted into St. Thomas's Hospital. Of

this number 37 died, a mortality of 14 per cent. This would probably be the death-rate of what may be termed a definite or sharp attack. Furbringer, dealing with 120 hospital cases, gives the mortality at 10 per cent. In the London Hospital the death-rate, as estimated three years ago, was over 20 per cent. Fowler, dealing with 99 cases at the Middlesex Hospital, records 15 deaths. These figures always appear high to the general practitioner, who must see a very large number of trifling attacks in which recovery takes place in a day or so, and cannot imagine that such patients are subjected to a risk to their lives represented by 14 per cent. Guttman, taking the cases of all grades occurring in the Moabit Hospital, found only 5 deaths in 96 cases.

Even Dr. Hawkins' statistics show that, in what some would call the "ordinary" cases, recovery is apparently invariable; and it must be remembered that the trifling attacks are in great excess even of the ordinary attacks. (For Dr. Hawkins' statistics see page 24.)

Perityphlitis would appear to be the most fatal in the quite young and the quite old.

The common causes of death are diffuse peritonitis, collapse, septicæmia, exhaustion, and troubles arising from the abscess.

When an abscess forms in perityphlitis it is probable that the risk to life is at once raised to 30 per cent. Bull found the death-rate in 67 cases of abscess which were not treated surgically to be 48 per cent.

Fitz in his analysis of 176 fatal cases found that the day of death was as follows :—

	Per cent.
Death on the 2nd day	4
" 3rd "	11
" 4th "	7
" 5th "	11
" 6th "	9
" 7th "	12
" 8th "	12
" 9th "	6
" 10th "	4
11th to 20th "	7
In 4th to 8th week	8·5

It will be noticed—and the matter is important in connection with treatment—that only 4 per cent die within forty-eight hours, and only twenty-two per cent before the fifth day.

The highest death-rate comes between the seventh and eighth days.

TREATMENT.—This may be considered under the three following heads: (i.) The treatment during an attack; (ii.) The treatment between the attacks; and (iii.) Operative interference.

(i.) **The treatment during an attack.**—Absolute rest in bed is imperative: a hypodermic injection of morphia is given, and a warm fomentation is applied to the abdomen. In children the injection of morphia will be replaced by a suitable dose of tincture of opium or of chlorodyne. In adults the amount of morphia given must vary with the

intensity of the pain. One-sixth of a grain will often suffice. It may be repeated if necessary; but it should be made a special condition of the treatment that as little morphia as possible be given, and that it be employed only to relieve pain. So long as there is any vomiting no food should be given by the mouth. Should the vomiting be very obstinate—a most unusual feature—all feeding (such as it is) must be by the rectum. When the vomiting has subsided the food given should be fluid, administered hot, and in small quantities. Hot weak tea, hot milk and lime water, hot beef tea, represent the usual elements of the diet at the beginning of the trouble. Ice and iced drinks are to be avoided. As time goes on the diet may become more liberal, but must remain fluid for some time. As a rule milk is not suited for these cases; if it be given it should be first peptonised. Some malted foods, or toast soaked in tea or milk and water, represent the transition to a more solid diet. Solid food—in the sense in which the term is usually employed—should not be given until the tongue is cleaning and until the bowels have been opened and the temperature has declined. Too long perseverance with a purely fluid diet often leads to troublesome flatulence, yet the too early employment of solid food leads to dyspepsia, to abdominal pain, and often to a revival of the fever.

The most difficult problem in the early treatment of the attack is that of an aperient. In my opinion the safest line of conduct in this particular is as follows:—If the onset be mild a purgative should be given at once. Over and over again an attack has apparently been cut short by a promptly administered aperient. Certain of the subjects of a mild degree of relapsing perityphlitis assert that, as a rule, they can bring an attack to a successful issue if they can take an aperient in time. In attempting to promote an action of the bowels it is best to give an enema at once. Should it cause a thorough evacuation of the bowel no further measure is needed; should it fail—as is very often the case—a purgative should be given without delay. Castor oil can seldom be tolerated, and if not, one grain of calomel may (in an adult) be administered every hour until four or five grains have been taken; or two drachms of sulphate of soda may be taken every hour until the bowels act, or until some four or five doses have been taken. Supposing, on the other hand, that the onset of the attack be very acute and severe, the administration of an aperient at once cannot be entertained. Morphia is to be given, and as soon as the pain has subsided an enema may be employed. If it act it is well; but very often it causes increased pain and utterly fails. In any case it should not be repeated, and no aperient should be given. The main indication is to restore a condition of rest within the abdomen. In the quite acute cases no aperient is of any avail; as a rule, indeed, the drug is vomited at once. It is well, therefore, in such cases to wait a few days until the acute manifestations have subsided, and then on the fourth to the sixth day—if the case be progressing well—to make an attempt to relieve the bowel by an aperient, followed or assisted by an enema. When the bowels have once acted we

should endeavour to maintain this action every other day, if there be no indication to the contrary.

If, as the case advances, there be a distinct local swelling with definite dulness, if the local symptoms be prominent, the fever persists, and the general phenomena show no improvement, five to six leeches may be applied over the right iliac region. This measure very often has a magical effect. The precise time at which leeches may be applied must depend upon the individual case; I have used them with advantage at various periods between the third and the ninth days. It is needless to say that when once suppuration has occurred they are useless. In perityphlitis the onset of suppuration is often unaccountably delayed.

The local application of ice has been credited with good results by some.

The patient should remain in bed, and be kept upon a spare diet until all fever has subsided, and until the cæcal region is free from tenderness and swelling. Too early movement is very apt to cause a relapse.

As soon as the bowels are acting freely, salol may be given (in a powder) in 10-grain doses night and morning. β -Naphthol is preferred to salol as an "intestinal antiseptic" by some physicians.

Certain writers have claimed marvellous powers for sodium salicylate in perityphlitis. The drug is given in 20-grain doses every three hours, and is especially advocated by those who believe in the rheumatic or gouty origin of the affection.

The patient should not resume an active occupation until he is perfectly sound, as a relapse is not uncommon. I have known a relapse to follow indiscreet massage after an attack.

(ii.) **The treatment between the attacks.**—In order to do what can be done to prevent another attack, the following measures are to be advised:—

The digestion must, above all things, be attended to. If the teeth be defective all deficiencies must be made good. In many instances I have known a set of false teeth to bring a case of relapsing perityphlitis to a favourable ending, the patients having had no further attacks. Experience shows that the bolting of ill-masticated masses of food is a common exciting cause of perityphlitis. The meals must be taken at regular hours, the patient must eat slowly, and must rest after each meal. These recommendations should be insisted upon. Not a few attacks in active business men can be ascribed to a hurried lunch, which is eaten to-day at one o'clock and to-morrow at three.

The food must be carefully selected, must be simple and digestible, and of such a kind as to leave as little refuse as possible in the intestine. Milk and much animal food seldom appear to answer in these cases. There is no pathological evidence to support the advice that the patient should especially avoid substances, such as strawberries, figs, or currants, which contain minute seeds. It is essential that he should avoid articles of food which are likely to remain undigested, or to be retained and to decompose in the bowel.

The bowels should be made to act daily. Enemas and aperients must be given if needed. They should be avoided if possible. Much may be done by suitable dieting and easy exercise to encourage a normal action. Indigestion is frequently at the bottom of the constipation which occurs in these cases.

Massage of the abdomen appears in many cases to have a very admirable effect; partly, it may be, by promoting the absorption of inflammatory exudations, and partly by encouraging a normal action of the bowels. Exercise in the open air is in every way to be encouraged.

Salol or β -naphthol may be given night and morning for a month at a time. These drugs undoubtedly have some effect in arresting the process of decomposition in the bowel, a fact which is often demonstrated in patients with an artificial anus. The salol must be given in a powder (in cachets); when in the form of a tabloid the drug is very apt to pass through the intestine unchanged.

The patient who wishes to avoid another attack should abstain from violent exercise, such as hunting; and should avoid exposure to fatigue, damp, and cold.

(iii.) **Operative interference.**—This question may be discussed under two heads: (a) Operative interference during an acute attack; (b) Operative interference in relapsing perityphlitis.

(a) *Operative interference during an acute attack.*—The main feature in this treatment consists in the urgent advice that a free incision should be made down to the inflamed area as soon as there is evidence that suppuration has taken place. To this rule there is practically no exception. It is not always easy to tell when suppuration has taken place; the swelling may be large and tender, the temperature may be high, the symptoms may persist for some days, and yet the whole may end in complete resolution. Cases which begin very acutely may end in speedy recovery, while those which begin mildly may pass on to suppuration (*vide* p. 30).

If the swelling is marked and the part very tender, the fever high, and all the local symptoms persisting and perhaps increasing, the question of operation becomes a pressing one.

It may be laid down as a rough rule that the use of the knife will very seldom be called for before the fifth day. Indeed, I would venture to think that surgical interference before the fifth day should not be undertaken except in the presence of emphatic symptoms. Indeed, the great majority of the operations for perityphlitis are performed after the first week.

The treatment of this disease by rational and precise surgical methods is a matter of recent years. The older method of practically leaving the malady to itself, and of not opening the abscess until it was about to burst through the skin, may excuse the excessive enthusiasm of some modern surgeons who have gone to the other extreme, and advise the use of the knife without compromise and without delay. One writer on this subject compares the delay in operating in perityphlitis to a like delay in

dealing with strangulated hernia. That the author does not recognise the incongruity of his comparison is shown by the following heroic advice:—"After persevering for forty-eight hours with this treatment" (an original treatment by means of opium, saline purgatives, and massage under ether), "if relief is not obtained, I would at once resort to laparotomy." Another American surgeon considers "all cases of appendicitis as being imminently dangerous to life from the beginning of the attack." This conclusion is absolutely at variance with facts. This surgeon always operates within twenty-four hours if medical treatment fail. Another writer asserts that if operation be delayed until the sixth day 50 per cent of the patients die,—an assertion which is also totally opposed to facts.

It is urged in favour of early incision that a large number of recorded cases afford examples of an operation performed too late, or of a fatal issue which could have been averted by operation. Such cases exist without doubt. They afford an argument in support of earlier interference, but do not necessarily imply that the opening of the abdomen within the first twenty-four, or forty-eight, or seventy-two hours should be the routine treatment of a case of perityphlitis. The number of cases which undergo spontaneous cure form an overwhelming majority, and cannot be lost sight of; nor can the opening of the abdomen through the muscular parietes over the cæcum be regarded as a trifling procedure. Again, it is urged that certain cases have ended fatally within the first thirty-six hours by perforation into the general peritoneal cavity. Such cases are, however, exceedingly rare; they cannot be anticipated, and they are not difficult to recognise. In most of them the very first symptoms are those of perforative peritonitis. When such a case is met with, the abdomen should of course be opened at once, and the perforation dealt with as the practice is in dealing with other forms of perforative peritonitis. A case of death from perforation within thirty-six hours of the appearance of the symptoms of perityphlitis does not afford a legitimate argument for the routine performance of an operation within that period, even in the majority of the cases. It would be as wise to advise immediate operation in all cases of ulcer of the stomach as soon as the diagnosis is made, because some cases of ulcer of the stomach end in a fatal perforation. Some of the milder forms of perityphlitis—those which end early in resolution—may begin with quite acute symptoms, so that the severity of the symptoms alone is not a test of the need for early operation; although it is true that, in general terms, the more acute the manifestations the greater the need for prompt surgical measures.

Then, again, it is asserted that the abscess, if left, will burst into the peritoneal cavity and cause death, and that such a termination has been recorded when the abscess contained but an ounce or so of pus. This assertion, again, does not afford an unqualified argument in favour of the early use of the knife. As a rule the abscess makes its way through the abdominal parietes, and does not burst into the general serous cavity. Dr. Bull has shown that in sixty-seven cases of abscess the pus escaped

in twenty-eight instances through the belly wall, and that in only eight examples did it burst into the peritoneal cavity. Whilst it is true that small collections of pus have followed the latter course, it is also true that abscesses containing pints of matter have been successfully opened through the integuments some weeks after the commencement of the symptoms of perityphlitis.

In this relation it must be remarked also that a very small collection of pus is not easy to discover, and that in not a few recorded cases an early incision did not reveal the collection. It is true that the sooner retained pus can be let out the better, but that aphorism does not guarantee the harmlessness of speculative incisions in search of it; especially when the pus is within the abdomen, and in a region the anatomical features of which are liable to variation. Moreover, it is desirable that the matter should be well localised, and that the resulting adhesions should have connected the inflamed district directly with the parietes. The later the operation is delayed the more easily and directly can the pus be reached. If a very early incision become the rule, it will frequently happen that the matter cannot be reached without first opening the general peritoneal cavity, and cannot escape without first finding its way into that space.

Deeply-seated pus is slow to make its presence evident, and in the majority of cases the evidence will not be unequivocal before the fifth day. Should its presence be made clear before that period it is obvious that surgical interference should not be delayed; and it must also be allowed that urgency of symptoms may justify an exploratory incision before the arbitrarily fixed time is reached.

If on incision made pus is discovered, the abscess cavity must be freely drained and treated upon the usual surgical principles.

The use of the exploring needle—which has been much advocated by American surgeons—is to be very strongly condemned. This needle is thrust into the iliac region of the abdomen, often to the depth of three or four inches, is passed in different directions, and is sometimes introduced three or four times at one sitting. The object is to discover pus. In the first place, it may be pointed out that deep-seated pus, in sufficient quantity to demand surgical interference, may be diagnosed by other means; and that if an exploration must be made it would be safer to trust to a cautious incision than to a series of plunges made in the dark.

In the next place, the use of the needle is not free from risk. In the course of its employment it must be thrust now and then into the cæcum, and, if that part of the bowel be in a condition of ulceration, it is possible that the needle may induce a suppuration that previously did not exist. It has been shown that the use of the hollow needle in extreme tympanites is not unattended with risk, and it is not to be expected that the risk will be less when it is thrust into the inflamed and softened coat of an important part of the bowel.

Perityphlitis is often due to extreme distension of the appendix with mucus. An appendix so involved may reach the size of a walnut.

This perityphlitis may end in complete resolution. A needle introduced during the acute period in such a case may very easily tap the distended septic process, allow a quantity of foetid mucus to escape, and so bring about a suppuration which was by no means inevitable.

It would be unfair to draw conspicuous attention to some cases in which repeated puncturings gave no evidence of pus, but in which an abscess appeared some days later. Even when an abscess does exist, it must be remembered that its walls are often formed by the cæcum and some coils of ileum matted together, and into such an abscess (when small) a needle can scarcely be introduced without risk.

The needle, moreover, does not always appear to justify the arguments for its use. In one of Dr. Bull's cases the needle-punctures revealed nothing, but an incision made immediately afterwards evacuated no less than four ounces of pus. In other instances such large quantities of matter have been let out shortly after the presence of pus had been made evident by the needle, that we may well presume that the pus might have been detected by other and simpler means.

Into the surgical details involved in the actual treatment of the abscess I have not here to enter, except to say that the pus should be reached by the most direct route and by a free incision, that faecal concretions should be gently sought for, and the appendix removed should it actually present itself. No deliberate and elaborate search should be made for it. The main indication is to open the abscess. The less the cavity is manipulated the better, and the bottom of a septic abscess is not the best place for carrying out the elaborate plastic operations advised by those who counsel the determined removal of the appendix in every case. Beyond a free opening and free drainage of the suppurating space the less done the better.

For the mortality of these measures see page 53.

(b) Operative interference in relapsing perityphlitis.—The treatment of cases of relapsing perityphlitis by removing the appendix during the period of quiescence offers, probably, more admirable results than are to be obtained in the treatment of any other form of the disease.

The circumstances which would justify an operation in these cases must be precisely defined, and it cannot be too emphatically stated that in a fair proportion of instances in which the trouble has relapsed no surgical interference is called for.

I am aware of many cases in which a patient has had three or more attacks of perityphlitis, and has then ceased to be troubled with any further outbreaks. In some examples of the relapsing form much can be done by the medical means already described, by diet, by attention to the bowels, and by placing the patient under conditions more favourable to a state of peace within the abdomen.

The operation simply consists in the removal of the offending organ—the appendix. I first proposed this operation (which should be carried out during a quiescent period) in 1887, in a paper read before the Royal Medical and Chirurgical Society. Since that date the pro-

cedure has been performed in a great number of cases, and not always, I venture to think, with proper discrimination.

The following are the more important circumstances which would justify an operation; and in all the cases with which I have dealt, one or other of the subjoined conditions has been present:—

(*a*) The attacks have been very numerous, although possibly slight. In some cases the patients had had twenty to thirty attacks.

(*β*) The attacks are increasing in frequency and severity.

(*γ*) The last attack has been so severe as to place the patient's life in considerable danger.

(*δ*) The constant relapses have reduced the patient to the condition of a chronic invalid, and have rendered him unfit to follow any occupation.

(*ε*) The patient is prevented from following a special employment unless he can consider himself free from the possibility of another attack.

(*ζ*) Owing to the persistence of certain local symptoms during the quiescent period there is a probability that a collection of pus exists in or about the appendix.

In the majority of the cases in which I have operated I have been able to make out the enlarged appendix after the acute symptoms had passed away.

It may be stated that the pain and distress involved by the operation will be less than that attending any but a slight attack, and that the risk of the procedure is less than that associated with an outbreak of perityphlitis considered generally. I have removed the appendix during the quiescent stage in over 150 cases of relapsing perityphlitis with only one death—a mortality of less than 1 per cent. The general mortality of an attack of perityphlitis cannot probably be less than 5 per cent (see page 52). In every one of the patients who have recovered from the operation the cure has been absolute and complete. The youngest patient upon whom I have performed the operation was seven years of age, and the oldest was over seventy. Ventral hernia is uncommon after this particular laparotomy.

The operation may prove to be very simple; on the other hand, it may prove to be exceedingly difficult. In one or two instances the removal of the appendix—on account of the nature of the adhesions—was found to be impossible.

The death-rate after removal of the appendix during a period of quiescence has been in my experience 1 per cent. In Dr. Hawkins' 38 cases of suppurative perityphlitis, 27 operations were performed. The abscess was in each case opened and drained. The appendix was not removed. Of this number four died, a mortality of 14·8 per cent. In six cases no operations were performed, all the patients died; in the remaining five cases the abscess burst into the bowel, with recovery in each instance.

FREDERICK TREVES.

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F. T.



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